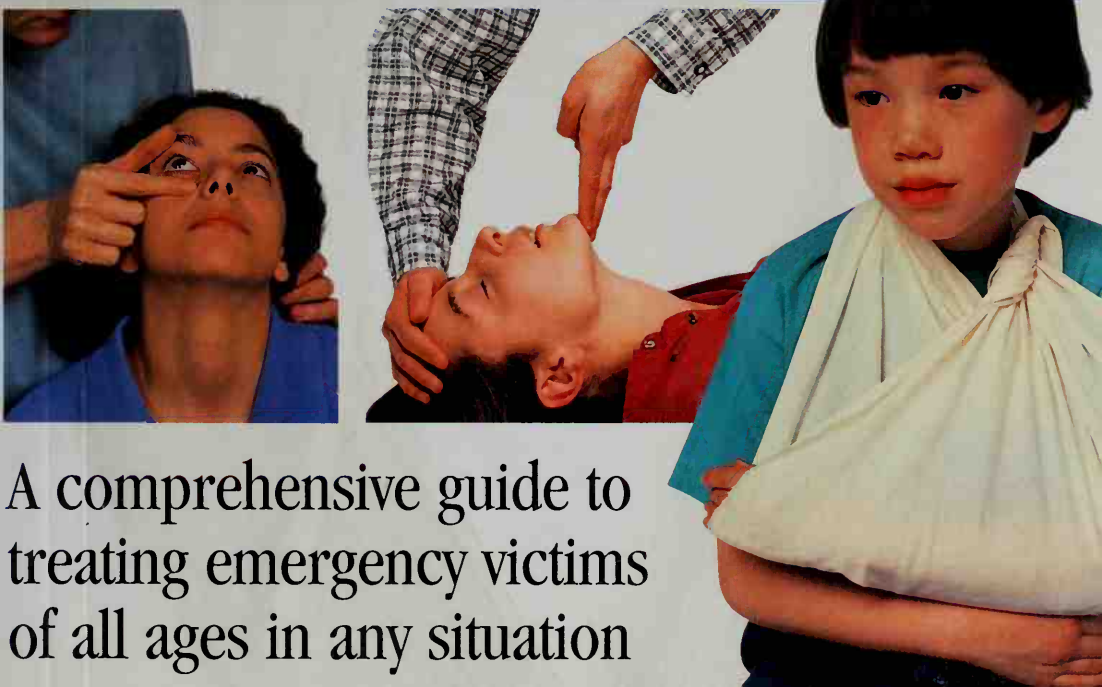




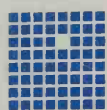
American College of
Emergency Physicians®



FIRST AID MANUAL



A comprehensive guide to
treating emergency victims
of all ages in any situation



American College of
Emergency Physicians®

FIRST AID MANUAL

The *American College of Emergency Physicians*, working in association with Dorling Kindersley Publishing, has created an essential and comprehensive first aid manual. The treatments and techniques are explained in step-by-step format and illustrated with hundreds of photographs showing exactly how to perform them correctly.

A 32-page emergency section at the end of the book sums up the most important life-saving procedures, including rescue breathing, cardiopulmonary resuscitation, treatment for a blocked airway, and other life-threatening situations. Illustrated anatomical sections explain the key concepts underlying first-aid techniques.

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4-

FIRST AID MANUAL





American College of
Emergency Physicians®

FIRST AID MANUAL

Foreword by

Michael T. Rapp, MD FACEP

Medical editor

Jon R. Krohmer, MD, FACEP





LONDON, NEW YORK, SYDNEY, DELHI, PARIS, MUNICH, and JOHANNESBURG

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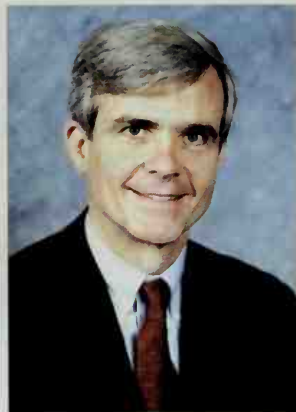
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FOREWORD

Americans make almost 100 million visits to hospital emergency departments each year seeking treatment for everything from heart attacks and strokes to cuts and sprains. The American College of Emergency Physicians (ACEP) has been representing the doctors who provide that care for more than 30 years. Our goal from the beginning has been to support high-quality emergency care – especially by providing education and information.



The American College of Emergency Physicians *First Aid Manual* should be in every household. This manual shows you what you can do, by yourself, to properly deal with many common injuries, and how to assist seriously injured or ill individuals while you wait for medical assistance. It explains treatments and techniques in a step-by-step manner and demonstrates with hundreds of photographs exactly how to perform them correctly.

Using the proper first-aid techniques can be crucial in an emergency situation. As an emergency physician who treats thousands of patients a year, I have seen many situations where providing the right care at the right time has made all the difference.

ACEP was founded by physicians who realized that in order to provide emergency care, a doctor must master a unique body of knowledge and skills. That's why ACEP's founders worked hard to establish emergency medicine as a specialty. Today, emergency medicine has its own residency training programs and its own board certification process. Specialists in emergency medicine play an ever-increasing role in meeting the emergency health care needs of our country. With the leadership provided by ACEP and the 22,000 emergency physicians the College represents, America has the best and most advanced emergency medical care in the world.

On behalf of the American College of Emergency Physicians and the dedicated emergency medicine specialists who provide care in hospital emergency departments throughout the country, I am very proud to introduce this important reference to you.

Michael T. Rapp, MD, FACEP
President, American College of Physicians, 1999–2000

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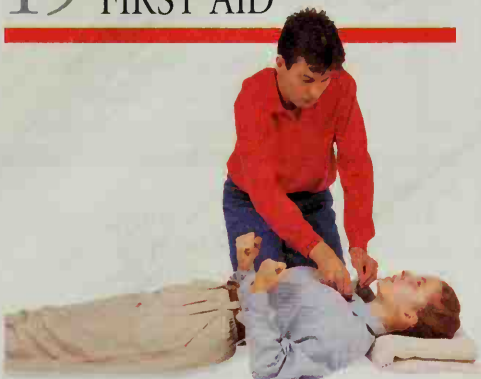
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INTRODUCTION

The American College of Emergency Physicians First Aid Manual is the first one available in the United States that uses photographs to give you clear and comprehensive step-by-step guidance.

However, first-aid techniques are constantly being reviewed to ensure that the victim is getting the best possible care. This edition includes the latest guidelines for all conditions, first-aid treatments, and resuscitation techniques that have been agreed upon and updated both in the US and internationally.

To help you to understand why and how first-aid techniques work, great emphasis has been placed on how people are structured (anatomy) and how we function (physiology).

A clearer understanding of what is normal should help you decide what may be wrong or abnormal, and enable you to provide the correct treatment.

There is a chapter on Emergency First Aid that gives you at-a-glance, life-saving action plans for all emergency situations. This quick-reference guide has been placed at the end of the Manual for easy access.

Wherever you use it, at home, at work, or in your car or boat, this indispensable Manual is the only guide to first aid that you will need to take you into the next millennium.

HOW TO USE THIS BOOK

Introduction describes the likely cause and effects of the injury or illness

Your goals in giving each first-aid treatment are summarized

DO NOT boxes warn you against actions that may endanger the victim and harm yourself

Color-coded chapters help you find relevant information quickly

IF statements help you to decide on the best course of action, depending on the victim's condition

FOREIGN BODIES IN THE EYE

A speck of dust, loose eyelash, or even a contact lens can literally float on the white of the eye, and is usually easily removed. However, anything that sticks to the eye, penetrates the eyeball, or rests on the colored part of the eye (the pupil and iris, see page 178) should not be touched.

RECOGNITION
There may be:
• Blurred vision
• Pain or discomfort
• Redness and watering of the eye
• Eyelids screwed up in spasm

See also:
Eye Wounds, page 188

TREATMENT

YOUR AIM IS:
• To prevent injury to the eye

1 Advise the injured person not to rub her eye. Sit her down facing the light.

DO NOT touch anything that is sticking to, or embedded in, the eyeball, or over the colored part of the eye.

2 Gently separate the eyelids with your finger and thumb. Examine every part of her eye.

3 If you can see a foreign body on the white of the eye, wash it out with a glass or an eyewash, and clean water.

4 If this is unsuccessful, providing the foreign body is not stuck in place, lift it off with a moist swab, or the damp corner of a tissue, or clean handkerchief.

IF the foreign body is sticking to or embedded in the eye, cover the affected eye with an eye pad and a bandage, then take or send the injured to the hospital.

IF the object is under the upper eyelid, ask her to grasp her lashes and pull the lid over the lower lid. Flushing under water may also make the object float clear.

180

Signs and symptoms are grouped to help you recognize quickly what is wrong with the victim

Cross-references direct you to associated conditions or complications

Step-by-step treatments enable you to act quickly and correctly

Photographs show first-aid techniques clearly

WHAT IS FIRST AID?

1

First aid is the immediate assistance or treatment given to someone injured or suddenly taken ill before the arrival of an ambulance, doctor, or other appropriately qualified person. The person offering this help must act calmly and with confidence, and above all must be willing to offer assistance whenever the need arises.

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BEING A	
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Confidence	13
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Being a First Aider

Most people can, by following the guidance given in this book, give useful and effective first aid. However, first aid is a skill based on knowledge, training, and experience. The term "First Aider" can apply to any person giving first aid, and is used in this manner throughout the book. It can also apply to someone who has completed a theoretical and practical instruction course, and passed a professionally supervised examination.

The American Red Cross and many EMS organizations give a variety of first-aid courses, at several different levels. You are **strongly** encouraged to contact a local group for a course specific to your needs. First-aid skills apply in many daily activities. In some cases, you may even save a life.

AIMS OF FIRST AID

- ◆ To preserve life.
- ◆ To limit worsening of the condition.
- ◆ To promote recovery.

A FIRST AIDER:

- ◆ Is trained in first aid skills.
- ◆ May have taken courses in first aid through the American Red Cross or an EMS organization.

BEING A FIRST AIDER

The first aid learned from a manual or course is not quite like reality. Most of us feel apprehensive when dealing with "the real thing." By facing up to these feelings, we are better able to cope with the unexpected.

Doing your part

First aid is not an exact science, and is thus open to human error. Even with appropriate treatment, and however hard you try, the injured may not respond as hoped. Some conditions lead to death, even with the best medical care. If you do your best, your conscience can be clear.

Assessing risks

The golden rule is, "First do no harm," while applying the principle of "calculated risk." You should use the treatment that is most likely to be of benefit to an injured person, but do not use a doubtful treatment just for the sake of doing *something*.

The "Good Samaritan"

This principle supports those performing first aid to the best of their abilities, but not those who act in gross negligence. The exact law varies from state to state, and you should check on the law in your area.

PROTECTING THE INJURED

To avoid infecting an injured person when giving first aid, try to:

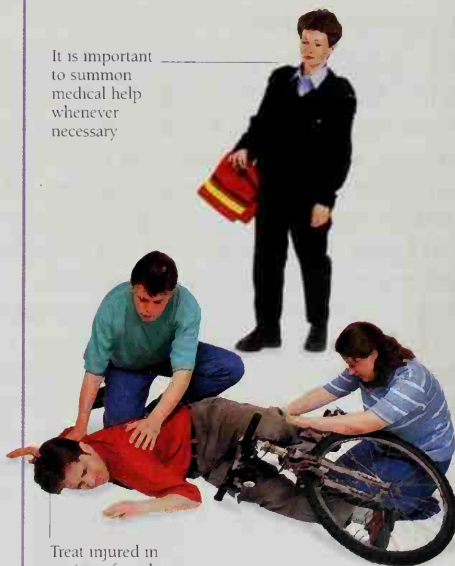
- ◆ avoid direct contact with body fluids where possible;
- ◆ wash your hands;
- ◆ wear protective gloves.

IF gloves are unavailable, life-saving treatment must still be given.

YOUR RESPONSIBILITIES AS A FIRST AIDER

- ◆ To assess a situation quickly and safely, and summon appropriate help.
- ◆ To protect the injured and others at the scene from possible danger.
- ◆ To identify, as far as possible, the injury or nature of the illness affecting the injured.
- ◆ To give each person early and appropriate treatment, treating the most serious conditions first.
- ◆ To arrange for the transport of the injured to the hospital, into the care of a doctor, or to his or her home.

It is important to summon medical help whenever necessary



Treat injured in position found

- ◆ To remain with the injured until appropriate care is available.
- ◆ To report your observations to those taking over care of the injured, and to give further assistance if required.
- ◆ To prevent cross-infection between yourself and the injured (*see left and page 14*) as much as possible.

More information regarding your responsibilities as a First Aider can be found on page 250.

GIVING CARE WITH CONFIDENCE

Every ill or injured person needs to feel secure and in safe hands. You can create an air of confidence and assurance by:

- ◆ being in control, both of yourself and the problem;
- ◆ acting calmly and logically;
- ◆ being gentle but firm with your hands, and speaking to the injured kindly but purposefully.

Building up trust

Talk to the injured throughout your examination and treatment.

- ◆ Explain what you are going to do.
- ◆ Try to answer questions honestly to allay fears as best you can. If you do not know the answer, say so.



- ◆ Continue to reassure the injured even when your treatment is complete – find out about the next-of-kin, or anyone else who should be contacted about the incident. Ask if you can help make arrangements so that any responsibilities the person may have, such as picking up a child from school, can be taken care of.
- ◆ Do not leave someone whom you believe to be dying. Continue to talk to the victim and hold his or her hand; never let the person feel alone.

Talking to relatives

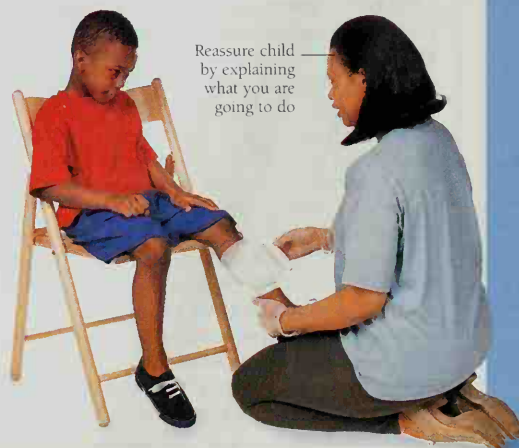
The task of informing relatives of a death is usually the job of the police or the doctor. However, it may be that you have to tell relatives or friends that someone has been taken ill or has been involved in an accident.

Always check that you are speaking to the right person first. Explain, as simply and honestly as you can, what has happened, and, if appropriate, where the person has been taken. Do not be vague or exaggerate; you may cause undue alarm. It is better to admit ignorance than to give misleading information.

Coping with children

Young children are extremely perceptive and will quickly detect any uncertainty on your part. Gain the confidence of an injured or sick child by talking first to someone he or she trusts – a parent if possible. If the parent accepts you and believes you will help, this confidence will be conveyed to the child.

Always explain simply to a child what is happening and what you intend to do; do not talk over his or her head. You should not separate a child from his or her mother, father, or other trusted person.



LOOKING AFTER YOURSELF

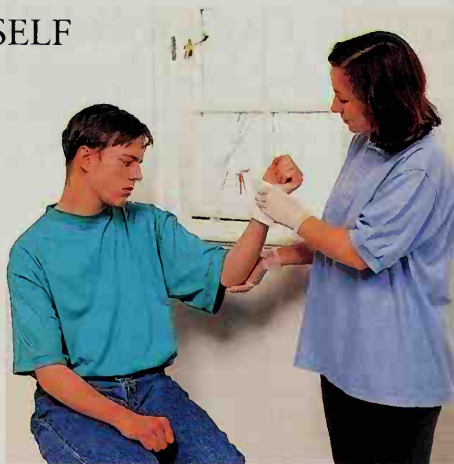
It is important not to jeopardize your personal safety. Do not attempt heroic rescues in hazardous circumstances.

Coping with unpleasantness

The practice of first aid can be messy, smelly, and distasteful, and you may feel that you will not be able to cope with this. Such fears are common but usually groundless. First-aid training will bolster your self-reliance and confidence and will help you control your emotions in a difficult situation.

Taking stock after an emergency

Assisting at an emergency is a stressful event, and you may suffer a "delayed reaction" some time afterward. You may feel satisfaction or even elation, but it is common to be upset, particularly if the injured was a stranger and you might not know the outcome of your efforts.



Above all, never reproach yourself, or bottle up your feelings. It often helps to talk over your experience with family, a friend, or your doctor.

See also:

Stress, page 27.

PROTECTING YOURSELF AGAINST INFECTION

You may worry about the possibility of picking up infections from the injured. Often, simple measures such as washing your hands and wearing protective gloves will protect both you and the injured person from cross-infection.

However, there is a risk that blood-borne viruses, such as hepatitis B or C and HIV (which can lead to AIDS – Acquired Immune Deficiency Syndrome), may be spread by blood-to-blood contact.

These viruses can be transmitted only if an infected person's blood makes contact with a break in the skin, such as a cut or abrasion containing blood or blood products, of another person.

In order to prevent cross-infection, you should follow these precautions:

- ◆ always carry protective gloves;
- ◆ cover your own sores or skin wounds with a waterproof bandage;
- ◆ wear a plastic apron when dealing with large quantities of an injured person's body

fluids, and wear plastic glasses to protect your eyes against splashes;

- ◆ take care not to prick yourself with any needle found on or near the injured, or to cut yourself on glass;
- ◆ if your eyes, nose or mouth or any wound on your skin is splashed by the injured person's blood, wash thoroughly with soap and water as soon as possible, and consult a doctor;
- ◆ use a mask or face shield (*see page 50*) for mouth-to-mouth respiration if the injured's mouth or nose is bleeding;
- ◆ dispose of blood and waste safely after treatment (*see page 218*).

Seeking immunization

First Aiders should seek medical advice on hepatitis B immunization from their own doctors. If, after giving first aid, you are concerned that you have been in contact with infection of any sort, seek further medical advice.

ACTION AT AN EMERGENCY

2

Effective first aid usually begins before any direct contact with the injured. You should approach any incident with firmness, authority, and control in order to reassure the victim and any bystanders. This is particularly important if there are multiple victims, when a calm, systematic attitude on your part can help prevent further injuries and enhance the survival of the injured.

The principles of emergency first aid

Clear rules exist to ensure safety in hazardous situations and this chapter will make you aware of these. You will also learn how and when to alert the emergency services, understand which branch is appropriate to different emergencies, and be able to brief them clearly on their arrival.

FIRST-AID PRIORITIES

Assess the situation

- ◆ Observe what has happened quickly and calmly.
- ◆ Look for dangers to yourself and to the injured.
- ◆ Never put yourself at risk.

Make the area safe

- ◆ Protect the injured from danger.
- ◆ Be aware of your limitations.

Assess the injured and give emergency first aid

- ◆ Assess each victim to determine treatment priorities, and treat those with life-threatening conditions first (see pages 30 and 44–58).

Get help

- ◆ Quickly ensure that EMS has been activated and is on its way.

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FIRST AID AT AN EMERGENCY

Keeping to a clear plan during an emergency will help ensure that you are effectively prioritizing the many demands upon your attention.

Do not allow yourself to become distracted by non-vital activities. Always bear in mind the main steps of emergency action – *Assess, Make Safe, Give Emergency Aid, and Get Help.*

- ◆ Control your feelings.
- ◆ Take a moment to think.
- ◆ Do not place yourself in danger.
- ◆ Use your common sense.
- ◆ Do not attempt too much alone.
- ◆ Be aware of potential dangers such as gas or chemicals: use your eyes, ears, and nose to look for clues, such as the hiss of propane or the smell of gasoline.

ASSESS THE SITUATION

Your approach should be brisk, but calm and controlled, so that you can quickly take in as much information as possible. Your priorities are to identify any risks to yourself, to the injured, and to any bystanders, then to assess the resources available to you and the kind of help you may need. State that you have first-aid

skills when offering your help. If no doctors, nurses, EMS personnel, or more experienced people are present, calmly take charge. First ask yourself these questions:

- ◆ is there any continuing danger?
- ◆ is anyone's life in immediate danger?
- ◆ are there bystanders who can help?
- ◆ do I need specialized help?

MAKE THE AREA SAFE

The conditions that caused the accident may still be presenting further danger. Remember that you must put your own safety first. You cannot help others if you become a victim yourself.

Often, very simple measures, such as turning off an electric switch, are enough to make the area safe. Sometimes more complicated procedures are required. Never put yourself and the injured at further risk by attempting to do too much; be aware of your limitations.

Dealing with ongoing danger

If you cannot eliminate a life-threatening hazard, you must try to put some distance between it and the victim, by attempting to remove the danger if possible. As a last resort, remove the injured from the danger (*see pages 235-49*). In many situations, you will need specialized help and equipment.

First switch off ignition, even if engine is not running



GIVE EMERGENCY AID

Once it is safe, quickly make an initial assessment of each victim following the ABC of resuscitation (see page 44–58), so that any person needing emergency first aid is treated immediately.

Establish whether each victim:

- ◆ is conscious;
- ◆ has an open airway;
- ◆ is breathing;
- ◆ has a pulse.

Your findings dictate your priorities and when and how much help is needed.

See also:

Initial Assessment, page 30.

DO NOT delay in summoning EMS.



GET HELP

You may be faced with a number of tasks: to maintain safety, to telephone for help (see next page), and to start first aid. Other people can be asked to:

- ◆ make the area safe;
- ◆ telephone for assistance;
- ◆ fetch first-aid equipment;
- ◆ control traffic and onlookers;
- ◆ control bleeding or support a limb;
- ◆ maintain the injured person's privacy;
- ◆ transport the injured to a safe place.

The control of onlookers

The reaction of bystanders may cause you concern or even anger. Most of them will have no first-aid training and that could make them feel helpless or frightened. If they have witnessed or been involved in the incident, they too may be injured without realizing it, and will certainly be distressed. If you need to ask a bystander to help, do so in a firm, but gentle manner.



TELEPHONING FOR HELP

You can summon help by telephone from a number of sources.

◆ *Emergency services (9-1-1):* police, fire, and EMS. Some areas in the US do not have 9-1-1 service. If you are in such an area, you must dial the number of your local emergency

service. Carry this telephone number with you at all times.

If it is necessary to leave an injured person alone, minimize the risk by taking any vital action first (see page 30). Make your call short but accurate and explicit.

FINDING A TELEPHONE

Emergency calls are free, and can be made on any telephone, including most cellular phones.

Most large companies have special arrangements for calling for assistance, and you should try to ensure that you are familiar with all of them.

If you have to ask another person to telephone for help, always ask him or her to come back after the call has been made. It is important to confirm that help is on the way.

MAKING THE CALL

On dialing 9-1-1, you will be asked which service you require, and will be put through to the appropriate dispatcher. Whenever there are injured people involved, ask for the emergency medical services.

When you get through to the dispatcher, give clear details of the accident or emergency (*see right*). If you are not sure of your precise location, do not panic – in many municipalities your call can be traced. Do not put the telephone down until the dispatcher has cleared the line.

You may be required to stay by the telephone to “lead in” the emergency services. If you decide to delegate this task, make sure that the person understands how important it is, and that he or she reports back to you.

CALLING THE EMERGENCY SERVICES



State your location and nature of the incident clearly.

The following details are essential

- ◆ Your telephone number.
- ◆ The exact location of the incident; a road name or number, if possible, and any junctions or other landmarks.
- ◆ The type and gravity of the incident, for example, “Traffic accident, two cars, road blocked, three people are trapped.”
- ◆ The number, sex, and approximate ages of the injured, and anything you know about their condition, for example, “Man, early fifties, suspected heart attack, cardiac arrest.”
- ◆ Details of any hazards such as gas, hazardous substances (*see page 20*), power-line damage, or relevant weather conditions, for example fog or ice.

MULTIPLE VICTIMS

In situations such as major traffic accidents, you may find yourself in the difficult position of having to deal with several victims at the same time. You may be on your own, or working with other First Aiders, until EMS arrives. A methodical and calm

approach will be crucial in the initial chaos. Always follow the ABCs of resuscitation (*see page 44*) in order to establish treatment priority, attending first to anyone who is unconscious. Remember, you can only do your best in these circumstances.

MAJOR INCIDENTS

Major incidents involving a large number of injured may place overwhelming demands on rescuers. The first task is to ensure that the emergency services are contacted immediately and given accurate information about the incident. The next priority is to assess the scene, and providing it is safe to do so, to start giving emergency first aid.

If other First Aiders come forward, give them as much information as possible. The most senior First Aider present should take charge of the team. When the emergency services arrive, they will take control.

When a major accident occurs, the police will establish rendezvous points and designate officers for all rescuers to report to. It is vital not to disturb any evidence on site, especially following fatal injuries, since a legal inquiry may follow.

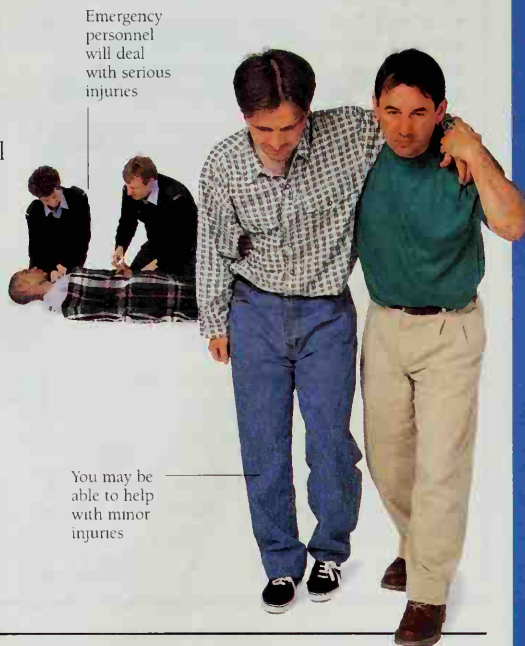
The role of the First Aider

At major public events, you may be able to help the on-site medical team until EMS arrives at the scene. When they do arrive, however, your role will obviously diminish.

At any major incident, you must leave the scene if asked to do so by a member of the emergency services. However, you may be asked to help the medical teams by performing simple tasks, for example holding intravenous bags or supporting limbs. Always do as you are asked; your help will be greatly appreciated.

How you can help

- ◆ Identify the serious victims and mark them for immediate treatment. Move anyone with minor injuries quickly from the site to allow access to serious cases; minor injuries can be treated when time allows. This process is called *triage*.
- ◆ Victims who are obviously dead should be left, so that help can be given to those who need it.
- ◆ Workers or residents at or near the site of a disaster should be alerted to security risks and any further hazards.



Emergency personnel will deal with serious injuries

You may be able to help with minor injuries

TRAFFIC INJURIES

Traffic injuries range from a fall from a bicycle to a major incident with multiple victims. Often, the accident site will present serious risks to safety,

largely because of passing traffic. It is essential to make the area safe – to protect yourself, the injured, and other road users.

MAKE THE ACCIDENT SITE SAFE

First ensure your own safety, and do not do anything that might create danger.

◆ Park safely, clear of the accident site.

Set your hazard lights flashing.

◆ Do not run across a busy highway.

◆ At night, wear or carry something light or reflective, and use a flashlight.

Then take these general precautions.

◆ Send bystanders to warn other drivers.

◆ Set up warning triangles or lights 220 yards (200 meters) in each direction.

◆ Switch off the ignition of any damaged vehicle and, if you can, disconnect the

battery. Switch off the fuel supply on diesel vehicles and motorcycles.

◆ Stabilize vehicles. If a vehicle is upright, apply the hand-brake and put it in gear, or put blocks at the wheels. If a vehicle is on its side, do not right it, but try to prevent it from rolling over.

◆ Look for physical dangers. Is anyone smoking? Are there any transport vehicles displaying hazardous substance symbols? Is there spilled fuel or damaged power lines? If you see a radiation hazard sign, alert emergency services.

HAZARDOUS SUBSTANCES

Accidents may be complicated by the spillage of dangerous substances or the escape of toxic vapors. Never make a rescue attempt unless you are sure that you will not come into contact with a dangerous substance. Keep bystanders away from the scene, bearing in mind that poisonous fumes may be released and travel some distance. Stand upwind of the accident to ensure that any fumes are blown away from you.

Hazardous substance symbols

The symbols shown below warn that a vehicle is carrying a hazardous substance. If in doubt about your safety, or the meaning of the sign, keep your distance, especially if there is any spillage. The numbers are coded and will be understood by the emergency services, so make a note of the numbers and pass them on when telephoning for help.



Explosives



Gases



Flammable liquids



Flammable solids



Oxidizers/Organic Peroxides



Toxic materials



Radioactive materials



Corrosive materials



Dangerous goods

CHECK THE INJURED

Quickly assess all victims, moving them only if they are in danger or you need to do so to apply life-saving treatment. Deal with life-threatening conditions first.

Search the area thoroughly, so that you do not overlook someone who may have been thrown clear in the accident or have wandered away while confused.



FOR AN UNCONSCIOUS VICTIM

1 Assume there is a neck injury until it has been proved otherwise. Support the head and neck with your hands, so that the victim can breathe freely.

DO NOT move the victim unless it is absolutely necessary.

2 Treat any life-threatening injuries if possible. Monitor and record breathing, pulse and level of response every ten minutes.

IF it is essential to move the victim you will need three additional people to help you: one to support the shoulders and chest, one for the hips and abdomen, and one for the legs. Support the victim's head continuously and direct all movements.

See also:

Back Injuries, page 142.

FOR A VICTIM TRAPPED UNDER A VEHICLE



1 If possible, try to find help to lift or move the vehicle and, only if it is absolutely necessary, drag the victim clear.

2 Mark the exact position of the vehicle and the victim. The police will need this information.

See also:

Crush Injuries, page 96.

FIRES

Rapid, clear thinking in a fire is vital. Fire spreads very quickly, so warn any people at risk, and alert the emergency services immediately. Panic also spreads quickly, so you must calm anyone who is likely to increase alarm.

If leaving a burning building, try to help everyone out of the building without putting yourself at risk. Shut all doors behind you. Look for fire exits and assembly points. You should know the evacuation procedure at your workplace. If visiting business premises, follow instructions given by staff.

If arriving at a fire or burns incident, STOP, OBSERVE, THINK, and DO NOT RUSH IN. There may be flammable or explosive substances, such as gas, or toxic fumes or a risk of electrocution. A minor fire can escalate in minutes to a serious blaze. If there is a risk to you, wait for the emergency services.

See also:

Burns and Scalds, pages 155-66.

Inhalation of Fumes, page 70.

DO NOT use elevators in any circumstances.

LEAVING A BURNING BUILDING



1 Activate the first fire alarm you see.



2 Close each door behind you as you go.



3 Do not run, but walk quickly and calmly.

DEALING WITH A FIRE

A fire needs three components to start and maintain it: ignition (an electric spark or open flame); a source of fuel (gasoline, wood or fabric); and oxygen (air). Remove any one of these to break this "triangle of fire". For example:

- ◆ switch off a car's **ignition** or pull the fuel cut-off on large diesel vehicles;
- ◆ remove from the path of a fire any combustible materials, such as curtains or cardboard, that may **fuel** the flames;
- ◆ shut a door on a fire to cut off its **oxygen** supply; smother flames with a smoke blanket or other impervious substance.

The triangle of fire
Eliminating any of the components necessary for combustion will break the triangle and prevent fire.



DO NOT attempt to fight a fire unless you have called the emergency services and made sure that you are not putting your own safety at risk.

CLOTHING ON FIRE

Always follow the same procedure for a victim with burning clothing: **STOP, DROP, AND ROLL.** If possible, wrap the victim before rolling them.

DO NOT attempt to use flammable materials to smother flames.

Act quickly to smother flames

Heavy fabric starves flames of oxygen and puts them out



What you can do

- ◆ **STOP** the victim panicking or running around or outside; any movement or breeze will fan the flames.
- ◆ **DROP** the victim to the ground.
- ◆ If possible, **WRAP** the person tightly in a coat, curtain, blanket (not the nylon or cellular type), rug, or other heavy fabric. The best fabric for this is wool.
- ◆ **ROLL** the victim along the ground until the flames have been smothered.

IF water or another nonflammable liquid is readily available, lay the victim down with burning side uppermost, and extinguish the flames by dousing him in plenty of the liquid.

IF your own clothes catch fire and help is not available, extinguish the flames by wrapping yourself up tightly in suitable material, and rolling along the ground.

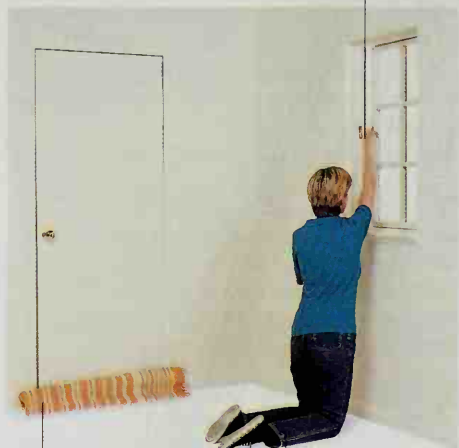
SMOKE AND FUMES

Any fire in a confined space creates a highly dangerous atmosphere that is low in oxygen and may be contaminated by carbon monoxide and toxic fumes. Never enter a burning or fume-filled building, or open a door leading to a fire. Leave it to the emergency services.

What you can do

- ◆ If trapped in a burning building, go into a room with a window and shut the door. If you must pass through a smoke-filled room, keep low down: the air at floor level is the clearest.
- ◆ If you have to escape through a window, go out feet first and lower yourself to the full length of your arms before dropping to the ground.

Open window and call for help



Put blanket or coat against bottom of door to keep out smoke

Keep low: smoke in room may not be visible

ELECTRICAL INJURIES

When a person is electrocuted, the passage of electrical current through the body may stun the victim, causing breathing and even the heart to stop. The current may cause burns both where it enters the body and where it leaves the body to go to "earth." Alternating current also causes muscle spasms that often prevent the victim from letting go of an electric cable, so that the victim may still be "live" when you come on the scene.

LIGHTNING

A natural burst of electricity discharged from the atmosphere, lightning forms an intense trail of light and heat that seeks contact with the ground through the nearest tall feature in the landscape, and, possibly, anyone standing by it.

A lightning strike may set clothing on fire and knock the victim down. Occasionally, it may cause instant death. Clear everyone from the site of a lightning strike as soon as possible.

HIGH-VOLTAGE CURRENT

Contact with high-voltage current, found in power lines and overhead high-tension (HT) cables, is usually immediately fatal. Severe burns always result. The sudden muscular spasm produced by the shock may propel the victim some distance, causing injuries such as fractures.

High-voltage electricity may jump ("arc") up to 20 yards (18 meters). Materials such as dry wood or clothing will not protect you. Do not put yourself in danger. Before you approach the victim, it is essential to ensure that the power is cut off and isolated.

ACTION

DO NOT approach the victim until you are officially told that the power has been cut off and, if necessary, isolated. Maintain a safe distance of 20 yards (18 meters) or more and keep any bystanders away.

1  **DIAL 9-1-1 OR CALL EMS**

2 The victim will probably be unconscious; once it is safe to do so, open the airway and check breathing and pulse, and be ready to resuscitate if necessary (see pages 44–58). Place him in the recovery position (see page 48).

3 Treat any burns (see pages 155–66) and associated injuries.

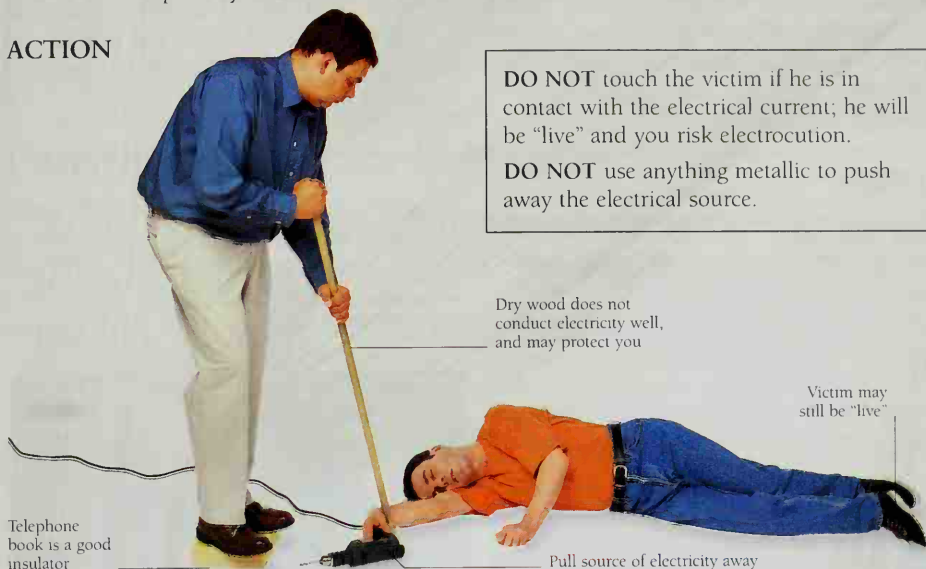
4 Take steps to minimize the effects of shock (see page 78).



LOW-VOLTAGE CURRENT

Domestic current, used in homes, offices, workshops, and stores, can cause serious injury, even death. Many injuries result from faulty switches, frayed insulation, or defects within an appliance itself. Young children are especially at risk.

ACTION



DO NOT touch the victim if he is in contact with the electrical current; he will be "live" and you risk electrocution.

DO NOT use anything metallic to push away the electrical source.

Break the contact by switching off the current, at the main switch or fuse box if it can be reached easily. Otherwise, unplug or disconnect the appliance.

IF you are unable to reach the plug or main switch, follow this procedure.

- ◆ Stand on dry insulating material such as a wooden box, a rubber or plastic mat, a telephone book, or a thick pile of newspaper. Push the victim's limbs away from the source with a broom, wooden chair or stool, or push the source away from the victim, whichever is the easier.
- ◆ Without touching the victim, loop rope around his feet or under the arms and pull him away from the source.
- ◆ If absolutely necessary, pull the victim free by pulling at his loose, dry clothing. Do this only as a last resort.

IF the victim is unconscious, open the airway, check breathing and pulse. Resuscitate if necessary (*see pages 44–58*). Place in the recovery position (*see page 48*). Cool any burns (*see page 160*), and **DIAL 9-1-1 OR CALL EMS.**

IF the victim seems to be unharmed, remember that electrical injuries can be more serious than they appear. The victim should still be observed closely and EMS called.

IF the victim's heart stops you should apply the ABC (Airway, Breathing and Circulation) of resuscitation (*see pages 44–58*) until a normal heartbeat returns or specific medical treatment can be given.

RESCUE FROM DROWNING

Open water in the US is often very cold, even in summer. Temperatures in the ocean range from 32°F (0°C) to 59°F (15°C); inland waters may be even colder. The cold increases the dangers to both the victim and rescuer, as it may cause:

- ♦ uncontrollable gasping on entering the water, with the consequent risk of water inhalation;

- ♦ a sudden rise in blood pressure, which can precipitate a heart attack;
- ♦ sudden inability to swim;
- ♦ hypothermia – if immersion in the water is prolonged or the victim is exposed to the wind.

See also:

Drowning, page 68.

Hypothermia, pages 170–72.

ACTION

YOUR AIMS ARE:

- To get the victim onto dry land with minimum danger to yourself.
- To treat the victim for drowning and hypothermia if necessary.
- To activate EMS.



1 Choose the safest way to rescue the victim. Remember to REACH AND THROW, DON'T GO into the water. Stay on land and reach out with your hand, a stick or branch, or throw a rope or a float.

IF you are a trained life-saver, or if the victim is unconscious, you may have to swim to the person and tow him to dry land. It is safer to wade than to swim.

IF the victim is unconscious, carry her with her head lower than her chest once she is clear of the water.

Support chest and knees and keep torso higher than head



IF drowning follows an injury sustained through diving, assume the victim has a neck fracture. Stabilize the head and neck to prevent movement (see pages 143–147).

2 Shield the victim from the wind if possible, to prevent the body from being chilled any further.

3 Treat the victim for drowning (see page 68) and the effects of severe cold (see page 172).

4 Take or send the victim to the hospital, even if they seem to have recovered well or, if necessary,

☎ DIAL 9-1-1 OR CALL EMS.

STRESS

Even for the most experienced First Aider, an emergency situation can be upsetting. It is natural to feel stressed whenever you are called upon to administer first aid, and to be very emotional once you have finished treating the injured.

Since it is likely that the incident will affect you afterward, it is important to face up to how you feel and what has happened. In extreme cases, you may experience the more serious condition, Post-traumatic Stress Disorder (see page 28).

COPING DURING AN EMERGENCY

Many First Aiders worry that they might not be able to cope in a real-life situation, but in fact your body has a natural mechanism that prompts you to act quickly in an emergency. In the “fight or flight” response (see right), your body is prepared for physical exertion. So the stress you will feel is your body’s way of getting you through a difficult situation.

Calming down

Although the “fight or flight” response is beneficial, sometimes too great a rush of epinephrine may affect your ability to cope. Taking slow, deep breaths will help you calm down, leaving you better able to remember your first-aid procedures.

“FIGHT OR FLIGHT” RESPONSE

When faced with any stressful situation, the body will automatically respond by releasing the hormones epinephrine, norepinephrine, and cortisol, which prepare the body to “fight or flee”. This response occurs in all animals as a reaction to a threatening or stressful situation, but in the human body the signs include:

- ◆ a pounding, rapid heart;
- ◆ deep, fast breathing;
- ◆ pupils widening to let in more light;
- ◆ increased sweating;
- ◆ alertness of mind;
- ◆ greater blood flow to the muscles;
- ◆ a rise in blood sugar level for energy.

FEELINGS AFTER THE INCIDENT

After you have treated the injured, depending on the type of incident and the outcome, you might experience:

- ◆ satisfaction and pleasure – it is natural to feel good about yourself if the treatment has gone well;
- ◆ confusion and doubt – you might question your actions and feel you could have done more, especially if the outcome is unclear;
- ◆ anger and sadness – being upset is normal, especially in major incidents; releasing these feelings at the time will help you get over the event more quickly.



Allow
yourself to
be comforted

DELAYED REACTION

Involvement in an incident can lead to stress once you have returned to your normal, everyday environment. The extent of the effect may depend on the level of your first-aid experience and the type of incident, and it is important to recognise the signs and deal with your feelings as soon as possible.

Symptoms and signs

Stress can lead to interference with a person's physical and mental well-being, and some people are more susceptible to it than others. It is quite normal to suffer

from some stress after a traumatic event. Stress can manifest itself in many different ways (*see below*), but these symptoms should pass in time.

Recognition

There may be:

- ◆ Tremor of the hands and stomach.
- ◆ Excessive sweating.
- ◆ Flashbacks of the incident.
- ◆ Nightmares or disturbed sleep.
- ◆ Tearfulness.
- ◆ Tension and irritability.
- ◆ A feeling of withdrawal and isolation.

DEALING WITH STRESS

If you experience stress after an incident, do not think that you are weak or over-reacting. It is important that you do not bottle up your feelings as this will cause you more stress. Your feelings can also be

relieved by exercise or relaxation techniques, such as meditation or yoga. In fact, doing any activity that you enjoy is a good way to relax and may help to relieve tension.

Talking to a friend

Face up to what has happened by confiding in a friend or relative. Ideally, speak to someone who also attended the incident: you may find they have the same feelings as you.



Dealing with stress alone

Try writing down your feelings and what happened, including all the positive actions you took. You can then use this as a talking point.



POST-TRAUMATIC STRESS DISORDER (PTSD)

If you have witnessed or experienced a serious threat to life or physical well-being, and suffer all of the following symptoms, you may have Post-traumatic Stress Disorder:

- ◆ reliving the event in some way;
- ◆ persistent avoidance of situations, people or situations associated with the event;

- ◆ persistent hyperactivity;
- ◆ symptoms that appear more than 30 days after the event, and last for a minimum of a month.

The condition can be made worse by reminders of the event, and it is important to see a doctor or counselor for help.

THE PRACTICE OF FIRST AID

3

In most situations that require first aid, there will be no life-threatening danger. You will simply be assisting a conscious victim, whose recovery from some minor injury or illness is not in doubt. In all cases, your aim is to work to a plan and discover what is wrong with the person, and to give prompt, correct treatment in a methodical way.

Assessing the situation

Before tending to the injured, however, you must survey the whole scene. Your first responsibility is to make sure that the area is safe. Often hazards such as passing traffic can be dealt with simply, but where the danger is too great or too imminent, you may need to move the injured even at the risk of aggravating the injury. Do this only if it is safe to approach them: you cannot help others if you also become injured. Only when the injured are safe can you begin to treat the illness or injury.

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THE FIRST AIDER SHOULD:

Preserve life

- ◆ Pay strict attention to safety (pages 16-26).
- ◆ Follow the ABC of resuscitation (pages 44-58).
- ◆ Control any major bleeding (pages 88 and 99).

Limit worsening of the condition

- ◆ Make an estimate of the injury or illness, if possible, by means of a thorough examination.
- ◆ Give priority to the seriously injured.
- ◆ Treat multiple injuries in order of priority, dealing with life-threatening conditions first. Consider the possibility of "hidden" secondary conditions.

Promote the victim's recovery

- ◆ Relieve any discomfort, pain or anxiety.
- ◆ Arrange for appropriate medical attention.
- ◆ Activate EMS.

INITIAL ASSESSMENT

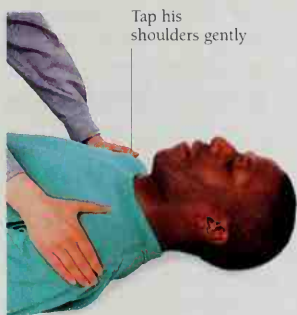
When you are sure that it is safe to do so, quickly perform a brief examination of the injured. This initial assessment is to check for any life-threatening conditions that need urgent first aid to preserve life.

You must perform the checks shown below before making a full assessment. If necessary, you should be prepared to carry out the appropriate steps to resuscitate the injured first.

If you suspect that there may be head or neck injuries involved, support the neck and, only if absolutely necessary, move the injured carefully.

Sending for help

If you think it is needed, send for help promptly (*see page 18*). Try to send someone else while you stay with the victim, but ensure that they report back to you after making the call.



Tap his shoulders gently

1 Check for consciousness

If the injured does not respond when spoken to, he may be unconscious. Try to elicit a response (*see page 46*). Be careful not to move the head or neck.



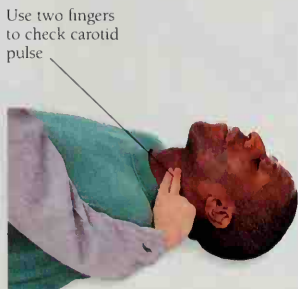
2 Open the airway

An unconscious person's airway may be blocked by the tongue falling back. If there is no possible neck injury, open the airway by lifting the jaw and gently tilting the head back (*see page 47*).



3 Check for breathing

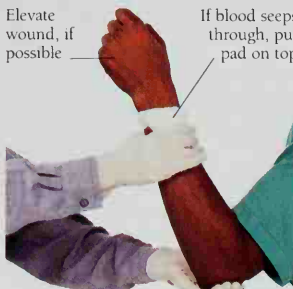
Once the airway is open, establish whether he is breathing by listening, looking, and feeling for signs (*see page 47*).



Use two fingers to check carotid pulse

4 Check for circulation

If the heart is beating strongly, you should be able to feel a pulse in the neck or at the wrist (*see page 77*).



Elevate wound, if possible

If blood seeps through, put pad on top

5 Check for bleeding

Severe loss of blood reduces the circulation to the vital organs, and can cause serious shock. Control serious bleeding (*see pages 88 and 99*) as soon as breathing and pulse are established (*see box, right*).

WHAT TO DO NEXT

As soon as you have established the condition of the injured, take appropriate action (*see pages 44–58*), based on whether he is:

- ◆ unconscious, not breathing, without a pulse;
- ◆ unconscious, not breathing, with a pulse;
- ◆ unconscious, breathing, with a pulse;
- ◆ conscious, breathing, with a pulse.

MAKING A DETAILED ASSESSMENT

Once you have completed your initial assessment and made sure that the injured is out of immediate danger, you need to make a detailed assessment; this often requires a thorough physical examination (*see page 34*).

The assessment is made on the basis of the *history* and *clues* to any medical condition, and *symptoms* and *signs* (*see page 32*). Circumstances will determine how detailed your

examination will be. In wet, cold conditions, when an ambulance is on its way, only serious injuries need attention – the priority is to keep the injured warm and dry. If a conscious person can describe the symptoms, concentrate on treating those.

In this book, the probable history, symptoms, and signs of specific illnesses and injuries are grouped under the heading *Recognition*.

HISTORY

This is the full story of how the incident happened, how the injury was sustained, or how the illness began and continued, including any previous conditions.

Question the injured, but if he or she is unconscious, talk to any onlookers.

Witnesses can give useful information, but they can be unreliable, particularly if they are upset. Try to form a full picture of what took place. Take into account:

- ◆ whether the injured has any illness or is taking any medication;
- ◆ the amount of force involved and how it was applied to the body;

◆ the environment – was the injured in a hot and stuffy room, or exposed to wind, snow or rain;

◆ the person's age and state of health: a young, fit adult who trips may sprain a wrist, but an elderly lady who does the same is more likely to have broken her arm or her hip;

◆ establish who the injured is, and where he or she lives;

◆ when the injured last had something to eat or drink.

Make a note of this information, including the time of injury and your examination.

EXTERNAL CLUES

If the injured is unable to cooperate or is unconscious, look for clues (beware of syringes if you suspect drug abuse). There may be an appointment card for a hospital or clinic or a card indicating a history of allergy, diabetes or epilepsy. Cyclists or horse-riders may carry such a card in a helmet or riding hat.

Medication carried by the injured may give valuable clues about the emergency. Medical warning items ("Medic-Alert") may be worn as a necklace or bracelet, or carried as a wallet card, and may provide medical information. Take care of any such item and give it to EMS to return it to the injured.



Epi-Pen or syringe (above)
Indicates tendency to anaphylactic shock. A syringe, when sugar lumps (left) may also be found, indicates diabetes.

"Puffer" inhaler (right)
Often carried by asthmatics and sufferers of angina



Warning bracelet (left)
Gives diagnosis and telephone number for more information about person's medical history

Medicines (right)
Nitroglycerin is taken for angina, phenytoin for epilepsy; indigestion tablets may indicate stomach ulcer



SYMPTOMS AND SIGNS

Every injury and illness manifests itself in distinctive ways that may help your assessment. These indications are divided into two groups: symptoms and signs. Some will be obvious, but others may be missed unless you examine the injured thoroughly from head to toe (see page 34). A conscious person should be examined, wherever possible, in the position found, or with any obvious injury comfortably supported; an unconscious

person's airway must first be opened and secured (see page 47). Do not remove clothing unnecessarily and do not leave the injured exposed to cold conditions any longer than required.

Use your senses – look, listen, feel, and smell. Be quick and alert, but be thorough, and do not make unjustified assumptions. You should handle the injured gently, but your touch must be firm enough to ensure that you feel any swelling or irregularity or detect a tender spot. Ask a conscious victim to describe any sensations your touch causes.

Watch the person's face for expressions of pain or anxiety throughout examination

Feel along and compare both sides of body at same time

Always examine from head to toe

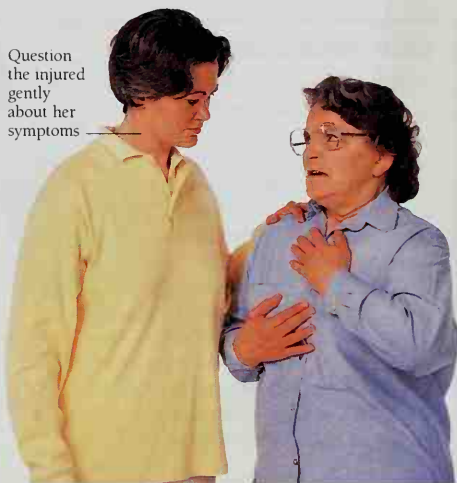


ASSESSING SYMPTOMS

Symptoms are sensations that the injured experiences, and may be able to describe, if she is conscious. Ask if she has any abnormal sensations, if there is any pain, where it is felt, what type of pain it is, and how movement affects it. If the pain did not follow an injury, find out how and where it began. Severe pain in one place can mask a more serious, but less painful, injury in another.

Ask if there are any other symptoms such as nausea, giddiness, heat, cold, weakness, or thirst. All symptoms should be assessed and confirmed, wherever appropriate, by an examination for signs of injury or illness.

Question the injured gently about her symptoms



LOOKING FOR SIGNS

Signs are details of a person's condition that you can see, feel, hear or smell. Many are obvious, but others may be discovered only during a thorough examination (see next page). Assess the person's level of response. If he or she is unconscious or unable to speak clearly, you may have to make an assessment purely on the circumstances of the incident, information obtained from onlookers, and the signs you find.

Apply your senses

Look for bleeding, discoloration or deformity. Feel the strength and rhythm of the pulse and listen to the breathing.

Gently feel parts of the body that are painful, noting tenderness or variation in the alignment of a bone. Note if the person is unable to perform any normal function, such as moving a limb. Use your sense of smell to search for clues.



SYMPTOMS AND SIGNS OF INJURY OR ILLNESS

The injured may tell you of these symptoms

- Pain • Anxiety • Heat • Cold • Loss of normal movement
- Loss of sensation • Abnormal sensation • Thirst • Nausea • Tingling
- Faintness • Stiffness • Momentary unconsciousness • Weakness
- Memory loss • Dizziness • Sensation of broken bone

You may see these signs

- Anxiety and painful expression • Unusual chest movement • Burns
- Sweating • Wounds • Bleeding from orifices • Response to touch
- Response to speech • Bruising • Abnormal skin color • Muscle spasm
- Swelling • Deformity • Foreign bodies • Needle marks • Vomit
- Incontinence • Containers and other circumstantial evidence

You may feel these signs

- Dampness • Abnormal body temperature • Tenderness to touch or pressure
- Swelling • Deformity • Irregularity • Grating bone ends

You may hear these signs

- Noisy or distressed breathing • Groaning • Sucking sounds (chest injury)
- Response to touch • Response to speech

You may smell these signs; remember to smell the injured's breath

- Acetone • Alcohol • Burning • Gas or fumes • Solvents or glue
- Incontinence • Cannabis

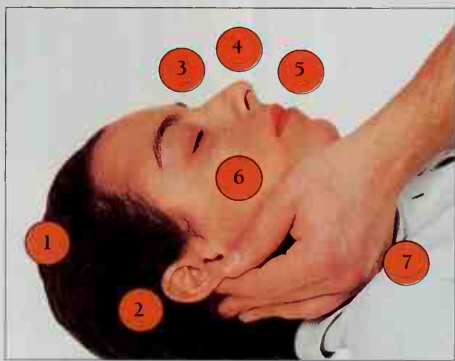
EXAMINING A PATIENT

A detailed examination of the patient should be undertaken only after taking any vital action needed (*see page 30*). You may need to move or remove clothing (*see page 35*), but ensure that, at every stage

of your examination, you do not move the patient more than is absolutely necessary. Always start at the head and work down; the “top-to-toe” routine is both easily remembered and thorough.

TOP-TO-TOE SURVEY

1 Run your hands carefully over the scalp to feel for bleeding, swelling or depression, that may indicate a possible fracture. Be careful not to move anyone who you think may have injured her neck, especially if she is unconscious.



2 Speak clearly to the injured in both ears to see if she responds or if she can hear. Look for blood or clear fluid (or a mixture of both) coming from either ear. These may be signs of damage inside the skull.

3 Examine both eyes, noting if they are open, the size of the pupils, whether they are equal in size, and whether they react to light (each pupil should shrink when light falls on it). Look for any foreign body, blood, or bruising in the whites of the eyes.

4 Check the nose for the same signs as in the ears. Look for blood or clear fluid (or a mixture of both) coming from either nostril. Any of these might indicate damage inside the skull.

5 Record the rate, depth, and nature (easy or difficult, noisy or quiet) of breathing. Note any odor on the breath. Look inside the mouth for anything that might endanger the airway. If dentures are intact and fit firmly, leave them in place. Look for any wound in the mouth or irregularity in the line of the teeth. Examine the lips for burns.

6 Note the color, temperature, and state of the skin: is it pale, flushed or gray-blue (*cyanosis*); is it hot or cold, dry or damp? For example, pale, cold, sweaty skin suggests shock; a flushed, hot face suggests heatstroke or fever. A blue tinge indicates lack of oxygen; look for this especially in the lips, ears, and face.

7 Loosen clothing around the neck, and look for any warning medallion, or hole in the windpipe left by a surgical operation (*see Stoma, page 51*). Run your fingers gently along the spine from the base of the skull downwards as far as possible, without disturbing the injured's position, checking for irregularity, swelling or tenderness.



Use both hands, and always compare one side of the body with the other: any swelling or deformity will be much more apparent.

8 Ask the injured to breathe deeply, and note whether the chest expands evenly, easily, and equally on the two sides. Gently feel the ribcage for any deformity, irregularity, tenderness or a grating sensation on breathing. Observe whether breathing causes the injured any pain or discomfort. Look for signs of bleeding from any wounds.

9 Gently feel along both the collar bones and the shoulders for any deformity, irregularity or tenderness.

10 Check the movements of elbows, wrists, and fingers by asking the injured to bend and straighten the arm at the joints. Check that she can feel normally with her fingers and there are no abnormal sensations in the limbs.

Note the color in the fingers, whether they are pale or gray-blue, as this indicates a problem with the circulation. Look for any needle marks on the forearms, or a warning bracelet. Take the pulse at the wrist (*see page 77*) or neck (*see page 52*).

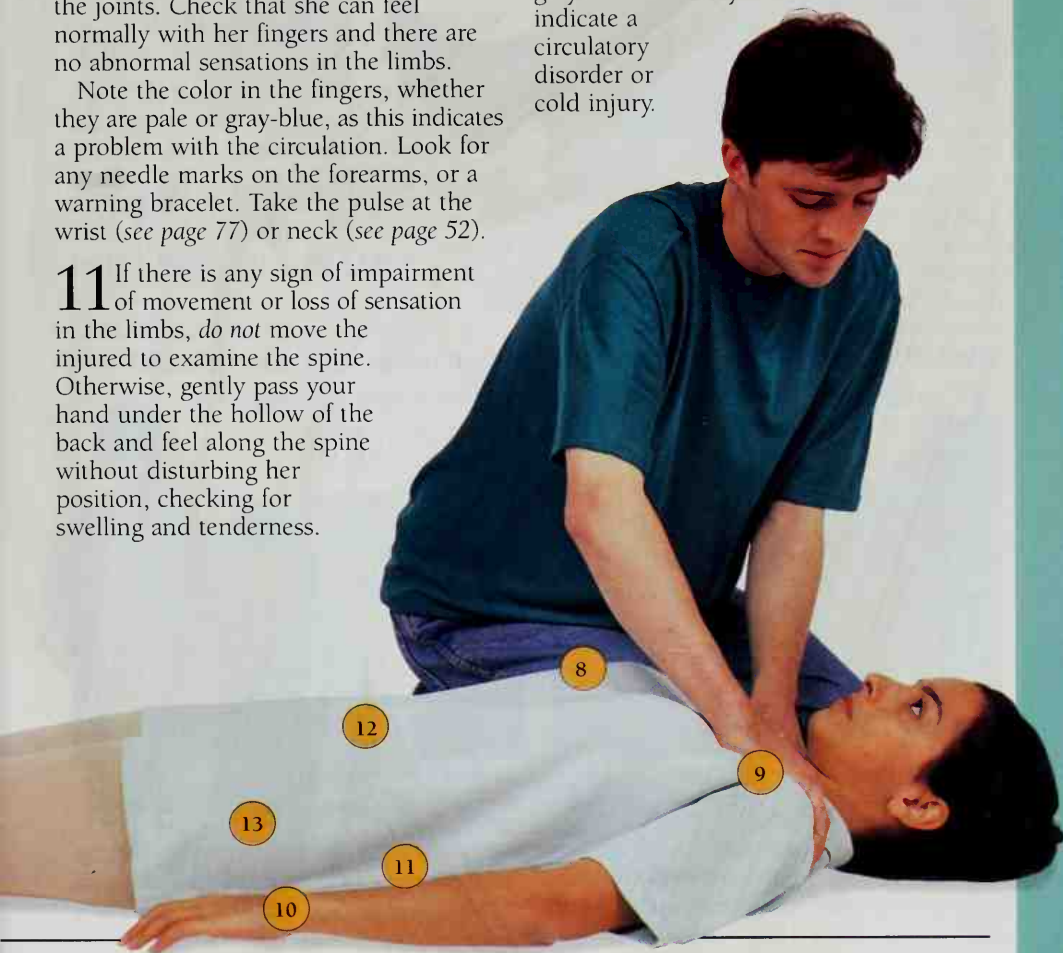
11 If there is any sign of impairment of movement or loss of sensation in the limbs, *do not* move the injured to examine the spine. Otherwise, gently pass your hand under the hollow of the back and feel along the spine without disturbing her position, checking for swelling and tenderness.

12 Gently feel the front of the abdomen for evidence of bleeding, and to identify any rigidity or tenderness of the muscular wall.

13 Feel both sides of the hips, and gently move the pelvis to look for signs of fracture. Note any incontinence or bleeding from orifices.

14 Ask the injured to raise each leg in turn, and to move her ankles and knees. Look and feel for bleeding, swelling, deformity or tenderness.

15 Check movement and feeling in all the toes. Look at their color: gray-blue skin may indicate a circulatory disorder or cold injury.



REMOVING CLOTHING

You may have to remove clothing to make a thorough examination, to obtain an accurate assessment, or to give the injured appropriate treatment. This should only be done if there will be a delay in EMS arriving. Clothing should be removed with the minimum of disturbance to

the person. Only remove as much clothing as is strictly necessary; try to maintain privacy for the injured and prevent exposure to cold conditions as far as possible. Do not damage clothing unless it is absolutely necessary and, where you can, cut along the seams or sleeves.

REMOVING FOOTWEAR



Undo or cut any laces

Support the ankle and carefully remove the shoe. Long boots should be left on until EMS arrives.

REMOVING SOCKS



If socks cannot be pulled off gently, lift each one away from the leg with your fingers and cut the sock with scissors.

REMOVING TROUSERS



Gently pull up the trouser leg to expose the calf and knee, or cut along the seam to reveal the thigh.

REMOVING A SWEATER

1 Carefully remove the person's uninjured arm from its sleeve.

Roll up garment and slip over head

Ask person to support injured arm



2 Ease the garment over the person's head, without disturbing the injured arm, if possible.

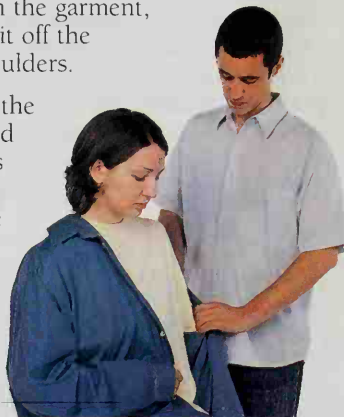
3 Support the injured arm and slip off the other sleeve of the garment.

REMOVING A COAT OR SHIRT

1 Unbutton the garment, and pull it off the person's shoulders.

2 Remove the uninjured arm from its sleeve first, and pull the garment around to the injured side.

Injured arm supported on lap



3 Support the injured arm and ease the garment off the arm, keeping the arm straight if possible.

REMOVING PROTECTIVE HELMETS

A protective helmet, such as a sports helmet, riding hat, or a motorcyclist's crash helmet, is best left on, and should be removed only if absolutely necessary (for example, a full-face helmet that encloses the head and face may prevent you from performing artificial respiration). Any helmet should always,

if possible, be removed by the injured. Ideally, two people are required to remove a helmet so that the head and neck are constantly supported.

The injured's head should also be carefully aligned with the spine in the neutral position (*see page 147*) if it is necessary to remove the helmet.

FOR AN OPEN-FACE HELMET

DO NOT remove the helmet unless it is absolutely necessary.

- 1 Unfasten the buckle, or cut through the chinstrap.
- 2 If the helmet or hat has sides, grip it from above, and force the sides of the helmet apart to take pressure off the head. Gently lift the helmet upward and backward to remove it.



FOR A FULL-FACE HELMET

DO NOT remove the helmet unless it is absolutely necessary.

- 2 Ask a helper, working from above, to tilt the helmet backward (try not to move the head at all) and gently lift the front clear of the injured's chin.



- 1 Undo or cut the straps. Working from the base of the helmet, ease the fingers of both your hands underneath the rim. Support the neck with one hand and hold the lower jaw firmly.

- 3 Continue to support the neck and jaw. Ask your helper to tilt the helmet forward slightly so that it will pass over the base of the skull, and then to lift it straight off the head.

TREATMENT AND AFTERCARE

Treat each condition methodically and calmly in order of priority. Reassure the injured, and listen to what he or she has to say. Do not keep questioning the injured, do not let people crowd around, and avoid moving him or her unnecessarily. Except for the most minor of situations, EMS should be called to evaluate the patient.

Treatment priorities

- ◆ Follow the ABC of resuscitation.
- ◆ Maintain a clear airway and assess breathing, pulse and circulation.
- ◆ Control bleeding.
- ◆ Treat large wounds and burns.
- ◆ Immobilize bone and joint injuries.
- ◆ Give appropriate treatment for other injuries and conditions.
- ◆ Check airway, breathing, and pulse (see pages 47 and 52) regularly and deal with any problem immediately.

Arranging appropriate aftercare

Ascertain whether the injured needs medical treatment. If you require

help, send someone else if possible, in the event that the condition of the injured alters or worsens. Stay with them until help arrives. According to your assessment, you may:

- ◆ call an ambulance or arrange transport to the hospital;
- ◆ pass care of the injured to a doctor, nurse or ambulance crew;
- ◆ call a doctor for advice;
- ◆ take the injured to a nearby house or shelter to await medical help;
- ◆ allow the injured to go home, accompanied if possible – ask if someone will be at home to meet him or her, or, if you can, arrange this;
- ◆ if the patient refuses, advise them to see a doctor.

DO NOT allow a person who has been unconscious, had severe breathing difficulty, or signs of shock, to go home. Stay until help arrives.

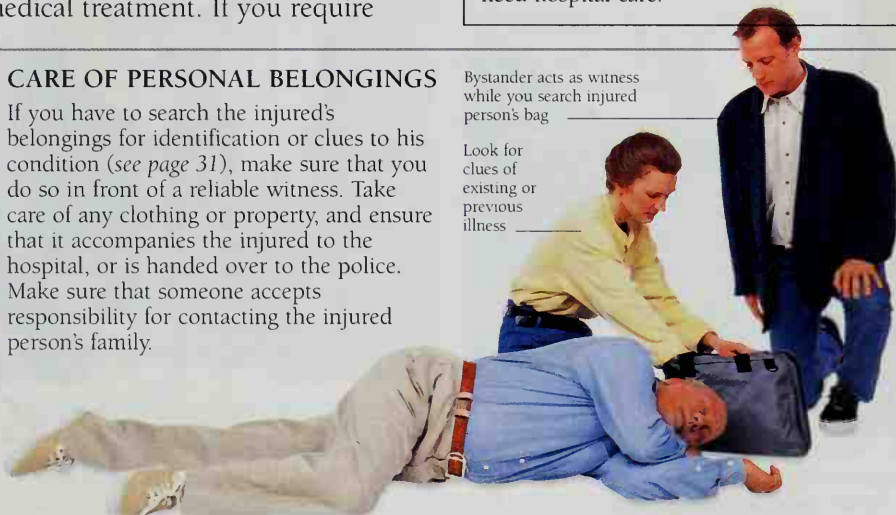
DO NOT give anything by mouth to a person who may have internal injuries or need hospital care.

CARE OF PERSONAL BELONGINGS

If you have to search the injured's belongings for identification or clues to his condition (see page 31), make sure that you do so in front of a reliable witness. Take care of any clothing or property, and ensure that it accompanies the injured to the hospital, or is handed over to the police. Make sure that someone accepts responsibility for contacting the injured person's family.

Bystander acts as witness while you search injured person's bag

Look for clues of existing or previous illness



PASSING ON INFORMATION

Having summoned medical aid, try to make notes about the incident and the condition of the injured so that you can pass on all the information you have gathered. The observation chart on the next page will enable you to note your observations of the injured's condition, such as pulse, breathing, and level of response, clearly and at intervals of ten minutes. If the injury is critical, record these observations more frequently.

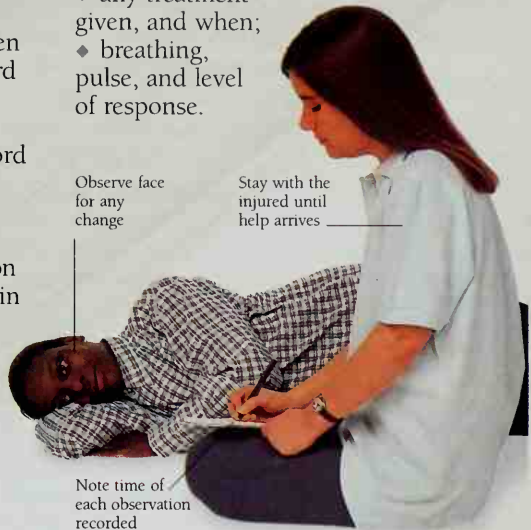
Make a brief written report to accompany your observations. A record of the timing of events is particularly valuable to medical personnel. Note carefully, for example, the length of a period of unconsciousness, the duration of a seizure, the time of any changes in the person's condition, and the time of any intervention or treatment.

If possible, stay with the person until medical help arrives, or accompany him or her to the hospital, so that you can hand over your notes personally.

Making a report

Your report should include:

- ◆ the injured's name and address;
- ◆ history of the accident or illness;
- ◆ a brief description of any injuries;
- ◆ any unusual behavior;
- ◆ any treatment given, and when;
- ◆ breathing, pulse, and level of response.



THE USE OF MEDICATION

Medication within first aid is largely confined to relieving general aches and pains, and is generally limited to helping a person to take acetaminophen, as described in relevant sections of this book.

A wide range of medications may be bought over the counter without a doctor's prescription, and you may know and have used many of them. However, when treating an ill or injured person, you must not buy or borrow medication to administer it yourself, even if the casualty has forgotten his or her own medication or you have the type they may normally expect to use.

If you administer or advise any medication other than those stipulated in this manual when giving first aid, the injured may be put at risk, and you could find yourself facing legal or civil action as a consequence.

If the necessary medication is not available, seek expert medical treatment. The only exception to this principle occurs where there are clear protocols laid down by an employer or voluntary organization. Such protocols allow trained staff or members to administer medication in specific circumstances, such as antidotes to industrial poisons (*see page 187*).

Whenever medication is taken, it is essential to ensure that:

- ◆ it is appropriate for the condition;
- ◆ it is not out of date;
- ◆ it is taken as advised;
- ◆ any precautions are strictly followed;
- ◆ the recommended dose is not exceeded whatever the circumstances;
- ◆ a detailed record is kept of all medication administered.

OBSERVATION CHART

The information from this chart will be very valuable when decisions are made about further treatment:

◆ use a photocopy of it to record your observations while waiting for help;

◆ check the appropriate boxes;
◆ update them at ten-minute intervals;
◆ send the completed chart, and any notes, with the person when he or she leaves your care.

DATE		PERSON'S NAME					
Time of observation (10-minute intervals)		0	10	20	30	40	50
Eyes Observe for reaction while testing other responses.	Open spontaneously						
	Open to speech						
	Open to painful stimulus						
	No response						
Movement Apply painful stimulus: pinch the earlobe or skin on back of hand.	Obeys commands						
	Responds to painful stimulus						
	No response						
Speech When testing responses, speak clearly and directly, close to injured person's ear.	Responds sensibly to questions						
	Seems confused						
	Uses inappropriate words						
	Incomprehensible sounds						
	No response						
Pulse (beats per minute) Take pulse at wrist or at neck on adult (page 260); at inner arm on baby (page 261). Note rate, and whether beats are weak (w) or strong (s), regular (reg) or irregular (irreg).	Over 110						
	101–110						
	91–100						
	81–90						
	71–80						
	61–70						
	Below 61						
Breathing (breaths per minute) Note rate, and whether breathing is quiet (q) or noisy (n), easy (e) or difficult (diff).	Over 40						
	31–40						
	21–30						
	11–20						
	Below 11						

RESUSCITATION

For life to continue, the body requires an adequate supply of oxygen to enter the lungs and be transferred to all cells in the body through the bloodstream. In particular, if the brain – the organ that controls all bodily functions – does not have a constant supply of oxygen it will begin to fail *after three or four minutes*. Without oxygen, a person will lose consciousness, the heartbeat and breathing will cease, and death will result.

The ABC of life

Three elements are involved in getting oxygen to the brain. The air passage, or *Airway*, must be open so that oxygen can enter the body; *Breathing* must take place so that oxygen can enter the bloodstream via the lungs; and the blood must travel around the body (*Circulation*), taking the oxygen to all the tissues and organs, including the brain.

Resuscitation techniques

The priority in treating any person is to establish and maintain effective breathing and circulation. This chapter tells you what you can do to assist someone whose breathing or heart has stopped. The sequence of techniques used to sustain life in the absence of spontaneous breathing and a heartbeat is known as *Cardiopulmonary Resuscitation (CPR)*.

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FIRST-AID PRIORITIES

- ◆ Keep the brain supplied with oxygen by following the ABC of resuscitation: open the *Airway*, and maintain *Breathing* and *Circulation*.
- ◆ Urgently obtain professional medical help.

BREATHING AND CIRCULATION

Oxygen is essential to support life. The process of breathing enables air, which contains oxygen, to be taken into the air sacs (*alveoli*) in the lungs (see page 60).

In the lungs, oxygen is absorbed by the blood and the waste product of breathing, carbon dioxide, is released. The blood is pumped to the lungs from the heart through *pulmonary arteries* to be oxygenated, and then returned to the heart through *pulmonary veins* to be circulated to the rest of the body.

Arteries carry the oxygenated blood from the left side of the heart around the body; veins bring deoxygenated blood back from the body to the right side of the heart (see page 76).

The composition of air

Air is a mixture of gases, of which 79% is nitrogen and 21% is oxygen. Only 5% of the oxygen is used up by respiration, so that when we exhale the air still contains approximately 16% oxygen, in addition to a small amount of carbon dioxide.

This means that the amount of oxygen that we breathe out is sufficient to oxygenate another person, when it is forced into his or her lungs during artificial respiration (see opposite, below).

See also:

The Resuscitation Sequence, page 45.

The Respiratory System, page 60.

The Circulatory System, page 76.

HEART AND LUNGS

In the pulmonary circulation, deoxygenated blood is pumped from the heart to the lungs, where it is oxygenated. It is returned to the heart before being pumped around the body.

Air passages

Passages of mouth and nose through which air enters and is warmed and humidified

Windpipe (trachea)

Pulmonary artery

Vessel that carries deoxygenated blood from heart to lungs

Pulmonary veins

Blood vessels that return oxygenated blood to heart

Air sac (alveolus)

Pharynx

Throat (*pharynx*) allows air to pass through into airway and food into esophagus

Epiglottis

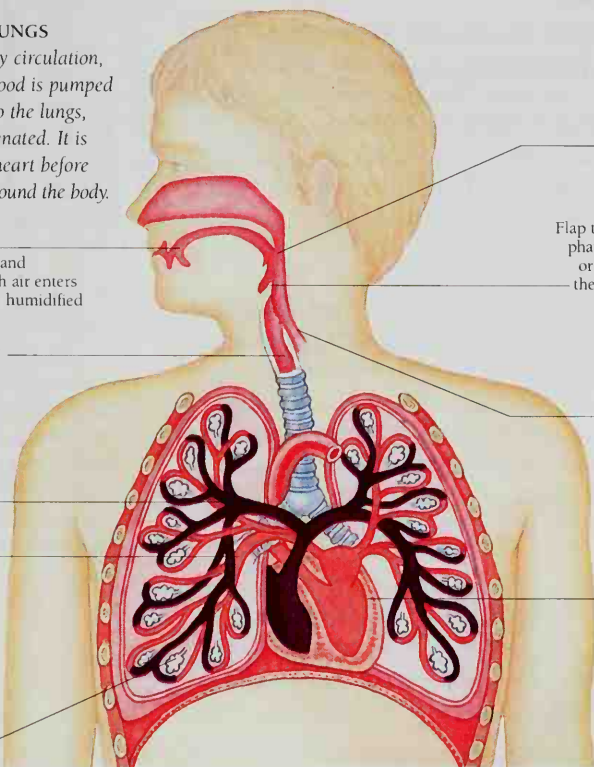
Flap that covers airway, where pharynx divides, to stop food or drink being inhaled into the lungs when we swallow

Esophagus

Muscular tube that carries food from pharynx to stomach

Heart

Powerful muscle pump with two pairs of chambers: *atria* which collect blood flowing into heart, and *ventricles* that pump it out again



HOW THE HEART BEATS

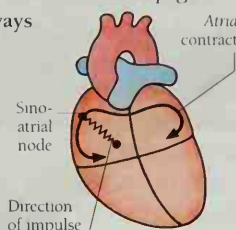
The walls of the heart are made up of specialized muscle fibers. The contraction of these fibers is synchronized by an "electrical" current produced by a node (*sinoatrial node*), situated in the wall of one of the upper chambers of the heart. This delivers an electric shock to the heart, jolting it into a normal rhythm of about 60–80 beats per minute.

When this impulse fails, the heart muscle cannot function properly, blood

stops circulating, and the brain is deprived of oxygen. The heartbeat can often be reestablished with a defibrillator (see page 84).

The electrical pathways

Impulses travel from the *sinoatrial node* to the upper chambers (atria), causing them to contract. The impulses then travel on to contract the lower chambers (ventricles).



WHAT CAN GO WRONG

- ◆ Damage to the tissues that conduct electrical impulses through the heart can cause the heartbeat to slow or stop.
- ◆ Fast electrical activity causes rapid heart rate, which may not pump enough blood.
- ◆ Chaotic electrical activity in the ventricles causes the loss of coordinated

pumping action (*ventricular fibrillation*).

- ◆ Processes that severely affect the function of the brain's respiratory center, such as a stroke (see page 119), can lead to a total cessation of breathing (*respiratory failure*). This results in complete absence of oxygen (*anoxia*) in the body.

RESTORING BREATHING AND CIRCULATION

The blood is oxygenated by breathing and is circulated around the body by the beating of the heart. If the body's natural mechanisms of breathing and heartbeat break down, it is essential

to resuscitate the victim by taking over the respiration and circulation, through artificial respiration and chest compressions respectively. This restores the supply of some oxygen to the brain.

Artificial respiration (see page 50)

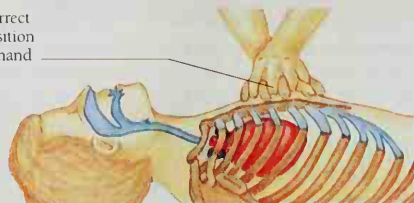
When breathing stops, blowing air into the lungs can give enough oxygen to keep a person alive. In mouth-to-mouth breathing, pinch the nose so that air cannot escape. The heart must be beating to circulate the oxygenated blood. If it is not beating, give chest compressions (see below).



Chest compressions (see page 52)

If the heart stops beating, blood does not circulate and the brain is starved of oxygen, so the heart needs mechanical help. By pressing down rhythmically, at about 100 compressions per minute, on the lower half of the chest, blood is driven from the heart. When pressure is released, the chest returns to its normal position, and blood refills the heart. Oxygenating the blood must be done with artificial respiration.

Correct position of hand



PRINCIPLES OF RESUSCITATION

For life to be sustained, a constant supply of oxygen must be maintained and delivered to the brain and other vital organs by the circulating blood. The “pump” that maintains this circulation is the heart. If the heart stops (cardiac arrest), urgent action must be taken if death is to be prevented.

In certain cases, the use of a machine called a “defibrillator” (see page 84), which is carried in most ambulances, can start the heart beating again, so you should call EMS immediately if you suspect cardiac arrest.

The victim is most likely to survive if:

- ◆ the flow of oxygenated blood is rapidly restored to the brain by means of artificial respiration and chest compression (cardiopulmonary resuscitation or CPR);
- ◆ a defibrillator is used promptly;
- ◆ the victim quickly receives specialized treatment from paramedics or in the hospital.

Although CPR is unlikely to restart a stopped heart, it is essential to carry it out. If it is applied correctly, it will keep the circulation going and help maintain the blood supply to the brain until expert help arrives.

Cardiac arrest – the chain of survival

The victim's chances of survival are greatest when all the following steps are taken.

Early access

Help is summoned as soon as possible so that a defibrillator can be brought to the scene

Early CPR

Resuscitation techniques are used to buy time until expert help arrives.

Early defibrillation

A controlled electric shock is given, which jolts the heart into a normal rhythm.

Early advanced care

Specialized treatment stabilizes the victim's condition quickly and efficiently.

THE ABC OF RESUSCITATION



A is for **AIRWAY**

Tilting the head back and lifting the chin will “open the airway.” The tilted position lifts the victim's tongue from the back of the throat so that it does not block the air passage (see page 47).



B is for **BREATHING**

If a victim is not breathing, you can breathe for him, and thus oxygenate the blood, by giving “artificial respiration,” blowing your own expired air into the victim's lungs (see page 50).



C is for **CIRCULATION**

If the heart stops, you can apply “chest compressions” to force blood through the heart and around the body. You must combine these with artificial respiration so that the blood is oxygenated (see page 52).

THE RESUSCITATION SEQUENCE

When dealing with a collapsed individual, following the sequence below will enable you to check the

responsiveness, breathing, and circulation, and show you how to resuscitate if necessary.

CHECK RESPONSIVENESS

Try to get a response by asking questions or tapping his shoulders (see page 46).



OPEN THE AIRWAY; CHECK BREATHING

Tilt the head back and lift the jaw to open the airway (see page 47). Check for breathing (see page 47).



IF the person is breathing, place him in the recovery position (see page 48).

RESCUE BREATHING

Look into the mouth and remove any obvious obstruction (see page 51). If the person is not breathing, keep the head tilted back, pinch the nostrils closed, and give two breaths of rescue-breathing (see page 50).



ASSESS FOR CIRCULATION

Check for signs of circulation (normal breathing, coughing, or movement). If any is present, continue to support breathing. If all are absent, begin CPR.

BEGIN CPR

Alternate 15 chest compressions to two breaths of artificial respiration. Repeat this sequence as necessary (see page 52).



WHEN TO CALL 9-1-1 OR EMS

- ◆ IF you have a helper, always send him or her to call 9-1-1 or EMS immediately.
- ◆ IF you are alone, breathing is absent, and the victim is a child, or the condition is due to injury or drowning, continue with the

resuscitation sequence for one minute, then call EMS. For any other adult victim, call EMS first, as soon as you discover breathing is absent, and then continue with the resuscitation sequence until help arrives.

RESUSCITATION TECHNIQUES

To assess and treat a person who has collapsed, use the resuscitation techniques outlined on the following

pages. If breathing and pulse return at any point, place the person in the recovery position (see page 48).

THE RESUSCITATION SEQUENCE

CHECK
RESPONSE



OPEN AIRWAY AND
CHECK BREATHING



RESCUE
BREATHING



ASSESS FOR
CIRCULATION

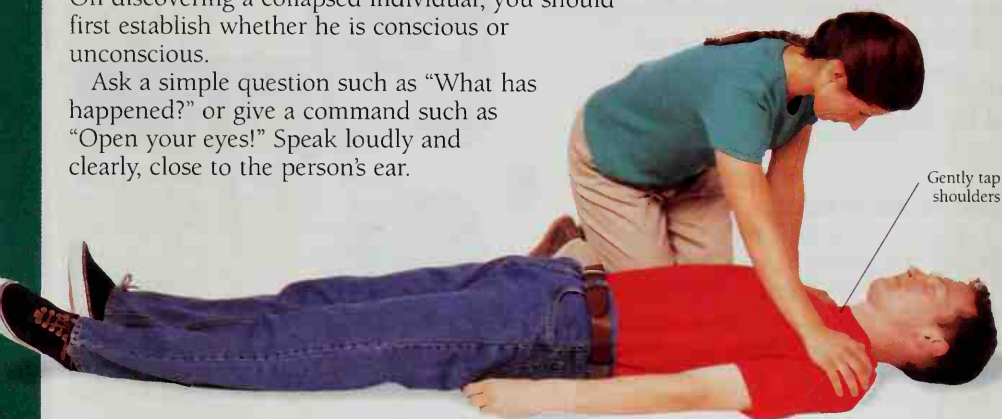


BEGIN
CPR

CHECKING RESPONSE

On discovering a collapsed individual, you should first establish whether he is conscious or unconscious.

Ask a simple question such as "What has happened?" or give a command such as "Open your eyes!" Speak loudly and clearly, close to the person's ear.



IF there is no response, try gently tapping his shoulders.

- ◆ A fully unconscious person will make no response at all.
- ◆ The person may respond to pain; try gently pinching the skin.
- ◆ A person who is only partially conscious may mumble, groan, or make slight movements.

ALWAYS assume there are head or neck injuries; handle the head carefully and shake the shoulders very gently.

IF a collapsed person does respond to you, keep a check on him until he recovers or help arrives, as he may drift in and out of consciousness.

THE AVPU CODE

There are different degrees of impaired awareness. You should assess the person quickly by using the AVPU code:

A - Alert

V - responds to Voice

P - responds to Pain

U - Unresponsive.

Check points

Eyes: do they remain closed?

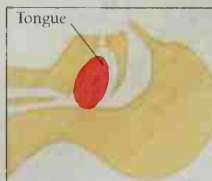
Speech: does the person respond to the questions you ask?

Movement: does the person obey commands? Does he respond to a painful stimulus, such as pinching?

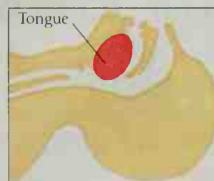
OPENING THE AIRWAY

An unconscious person's airway may become narrowed or blocked. This makes breathing difficult and noisy, or completely impossible.

The main reason for this is that muscular control in the throat is lost, which allows the tongue to fall back and block the airway. Lifting the chin and tilting the head back lifts the tongue away from the entrance to the air passage, allowing the person to breathe.



Blocked airway
Unconsciousness relaxes the muscles, the tongue falls back and blocks the throat, preventing breathing.

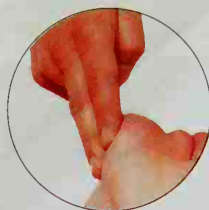


Open airway
Head tilt and chin lift enable the tongue to be lifted from the back of the throat, leaving the airway clear.

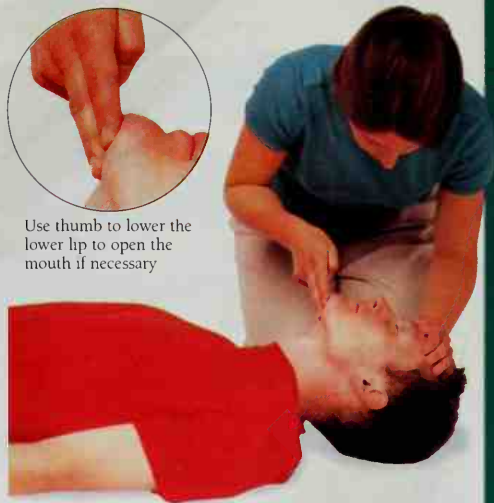
TO OPEN THE AIRWAY

Placing two fingers under the point of the person's chin, lift the jaw. At the same time, place your other hand on the person's forehead, and gently tilt the head back.

If you think that there are head or neck injuries, keep the head, neck, and spine aligned in the neutral position (*see page 144*) to avoid injuring the victim further. To open the airway, lift the jaw, keeping the head and neck in the neutral position.



Use thumb to lower the lower lip to open the mouth if necessary

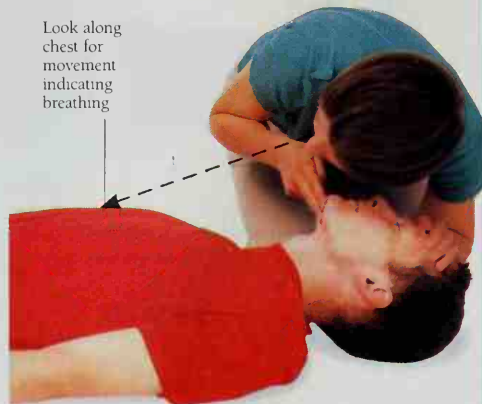


CHECKING BREATHING

Kneel beside the person, and put your face close to his mouth. Look, listen, and feel for breathing.

- ◆ Look along the chest to see if the chest rises, indicating breathing.
- ◆ Listen for sounds of breathing.
- ◆ Feel for breath on your cheek.

Do these checks for up to ten seconds before deciding that breathing is absent.



THE RECOVERY POSITION

An unconscious individual should be placed in the recovery position. This position prevents the tongue from blocking the throat and, because the head is slightly lower than the rest of the body, it allows liquids to drain from the mouth, and reduces the risk of inhaling stomach contents.

The head, neck, and back are kept aligned, while the bent limbs keep the body propped in a comfortable and

secure position. If you are forced to leave an unconscious person unattended, he or she can safely be left in the recovery position while you get help.

The technique shown below assumes that the victim is found lying on his back. Not all the steps will be necessary if a victim is found lying on his side or front.

See also:

Stabilizing a Person with a Spinal Injury, page 146.

METHOD

1 Kneel beside the victim. Before turning him, remove any fragile or bulky objects from his pockets. Open his airway by tilting the head and lifting the chin (*see page 47*). Straighten his legs. Place the arm nearest to you at right angles to the victim's body.



2 Bring the arm furthest from you across the chest, and place the back of the victim's hand against his opposite cheek. With your other hand, pull up the far leg just above the knee, keeping the foot flat on the ground.

DO NOT use this method if you suspect spinal injury (*see page 146*).



5 Tilt the head back to ensure that the airway remains open; if necessary, adjust the hand under the cheek. Adjust the upper leg so that both the hip and the knee are bent at right angles.

6 **DIAL 9-1-1 OR CALL EMS.** Monitor and *record* breathing and pulse every ten minutes until help arrives.

MODIFYING THE RECOVERY POSITION FOR INJURIES

You may have to modify the recovery position for certain injuries. For example, a victim with a spinal injury needs extra support at the head and neck, and his head and trunk must be aligned at all times (see page 146). If limbs are injured and cannot be bent, placing rolled blankets around the victim, or getting extra helpers to support him, can stop him from toppling forward.

THE RESUSCITATION SEQUENCE

CHECK
RESPONSEOPEN AIRWAY AND
CHECK BREATHING**RESCUE
BREATHING**ASSESS FOR
CIRCULATIONBEGIN
CPR

RESCUE BREATHING

The body, especially the brain, requires oxygen to keep the cells alive. The air that you breathe out still contains about 16% oxygen, so it can save life if it is blown into the victim's lungs (artificial respiration). If the pulse is absent, artificial respiration must be combined with chest compressions (cardiopulmonary resuscitation or CPR, *see page 52*), otherwise the oxygen will not reach the body's vital organs.

USING FACE SHIELDS

Artificial respiration carries little risk of the transfer of infection. However, First Aiders may receive training in the use of face shields for hygienic purposes. If you are trained to use a shield, carry one at all times – but if you do not have one with you, you should never hesitate to give someone mouth-to-mouth breathing.

GIVING MOUTH-TO-MOUTH BREATHING

1 With the victim lying flat on his back, open the airway by tilting the head back and using two fingers to lift the chin (*see page 47*).

2 Remove any *obvious* obstruction, including broken or displaced teeth or dentures, from the mouth. Leave well-fitting dentures in place.

3 Close the nose by pinching it with your index finger and thumb. Take a full breath, and place your lips around the mouth, making a good seal.

4 Blow into the mouth until you see the chest rise. Take about two seconds for full inflation.

5 Remove your lips and allow the chest to fall fully, which takes about four seconds. Repeat this once and then assess for signs of circulation (*see page 52*).

IF there are no signs of recovery, such as return of skin color, or any movement, such as swallowing, coughing, or breathing, begin cardiopulmonary resuscitation (CPR, *see page 52*) immediately.



IF the pulse is present, continue rescue breathing every five seconds, and check the pulse after every ten breaths.

IF breathing returns, place the victim in the recovery position (*see page 48*).

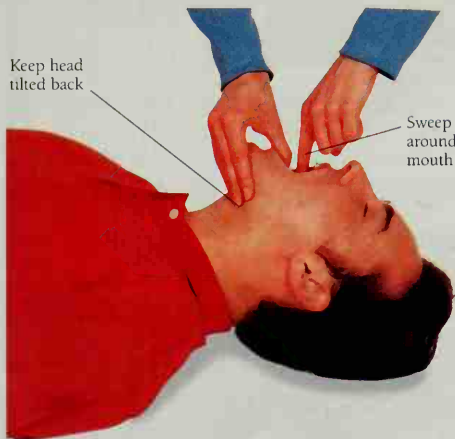
IF THE CHEST DOES NOT RISE

If after attempting two rescue breaths the chest does not rise, check that:

- ◆ the head is tilted sufficiently far back;
- ◆ you have closed the nostrils completely;

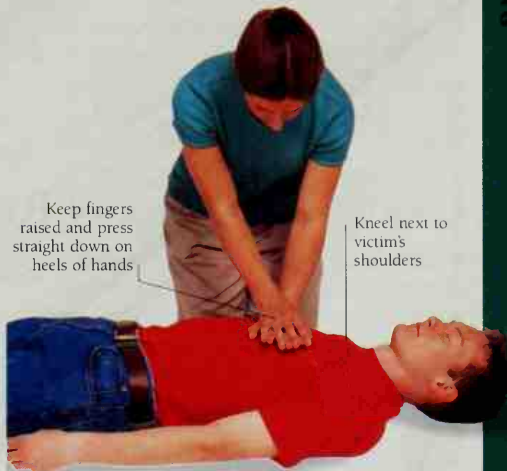
- ◆ you have a firm seal around the victim's mouth;
- ◆ the airway is not obviously obstructed by vomit, blood, or a foreign body.

CLEARING AN OBSTRUCTION



1 If you can see any *obvious* obstruction inside the mouth, use your finger to hook it out carefully.

DO NOT use your fingers to feel blindly down the throat.



2 Attempt artificial respiration again. If the chest still does not rise, give chest compressions to clear the airway obstruction (*see page 65*). Begin rescue breathing when the airway obstruction has cleared.

OTHER FORMS OF ARTIFICIAL RESPIRATION

In situations such as rescue from water, or where mouth injuries make a good seal impossible, you may choose to use the mouth-to-nose method of artificial respiration. While it is usually easy to blow air into the nose, it is not as easy for the air to escape; the soft parts of the nose may flop back like a valve.

To give mouth-to-nose respiration

With the victim's mouth closed, form a tight seal with your lips around the nose, and blow. Open the mouth to let the breath out. For babies, use the mouth-to-mouth-and-nose method (*see page 57*).

Mouth-to-stoma respiration

A laryngectomy is someone whose voice box (*larynx*) has been surgically removed, leaving a permanent opening (*stoma*) in the front of the neck through which breathing takes place.

Artificial respiration must be given through the stoma. If the chest fails to rise and air escapes from the victim's mouth, he or she may be a "partial neck breather." In this situation, it is necessary to close off the mouth and nose with your thumb and fingers while giving mouth-to-stoma respiration.

THE RESUSCITATION SEQUENCE



ASSESSING FOR CIRCULATION

Check for signs of circulation by looking for signs of recovery, such as return of color to the skin, any movement such as breathing, swallowing, and coughing.

IF there are no signs of circulation, begin chest compressions immediately.

CARDIOPULMONARY RESUSCITATION (CPR)

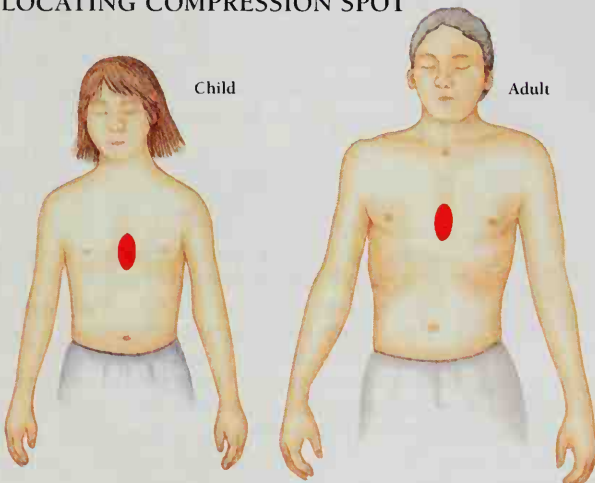
If there is no circulation, the heart has stopped beating and you will have to provide an artificial circulation (see page 43) by means of chest compressions.

To be of any use, chest compressions must always be combined with artificial respiration. This process is known as cardiopulmonary resuscitation, or CPR for short. If both you and your helper have been trained to administer CPR, you can do so together.

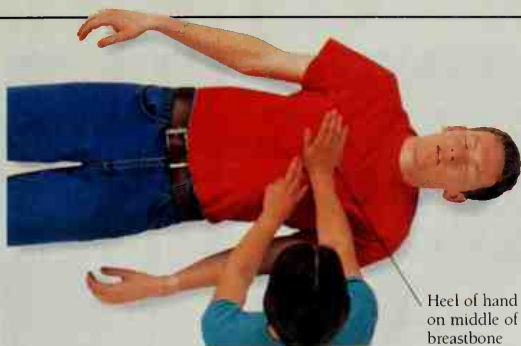
Calling EMS

- ◆ If you have a helper, send him or her to call EMS immediately. Continue treating the victim until help arrives.
- ◆ If you are alone and the condition is due to injury or drowning, give resuscitation for one minute (see page 45), then call EMS. For any other adult victim, call EMS, and then begin resuscitation (see page 45). Continue until help arrives.

LOCATING COMPRESSION SPOT



Although the photographs in this book show CPR being performed on fully clothed victims, the victim's shirt should be opened or removed before you give compressions. Doing so will allow you to see the victim's chest and rib cage, ensuring that you apply compressions in the appropriate spot. This area is indicated in red in the drawings of a child and adult at the left.



Heel of hand on middle of breastbone

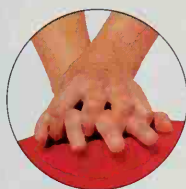
1 Kneel beside the victim. Place the heel of your hand on the middle of the breastbone on the nipple line (*see opposite*). This is the point at which you should apply pressure.



Keep fingers clear of chest

2 Place the heel of your other hand on top of the first, and interlock your fingers.

You may find it useful to count "one and two and ..." to keep time



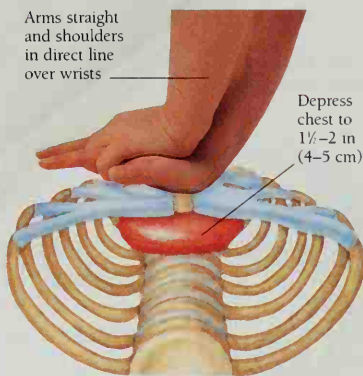
Interlock fingers

Press straight down on heels of hands

Keep arms straight

HOW CHEST COMPRESSIONS WORKS

Pushing down vertically on the breastbone squeezes the heart against the backbone, expelling blood from the heart's chambers and forcing it into the tissues. As pressure is released, the chest rises, and replacement blood is "sucked" in to refill the heart. This blood is then forced out of the heart by the next compression.



3 Leaning well over the victim, with your arms straight, press vertically down and depress the breastbone approximately 1½–2 in (4–5 cm). Release the pressure without removing your hands.

4 Compress the chest 15 times, aiming for a rate of 80–100 compressions per minute. Then give two breaths of artificial respiration (*see page 50*). Continue this cycle of alternating 15 chest compressions with two rescue breaths until help arrives.



RESUSCITATION FOR CHILDREN

Respiratory failure is the main cause of cardiac arrest in a child. The resuscitation techniques used depend

on the child's age and size (*see page 58*). If she is aged eight or over, use the adult sequence (*see page 45*).

CHECK RESPONSIVENESS

Try to get a response by talking to the child or tapping her shoulders. A baby should not be shaken.



OPEN THE AIRWAY; CHECK BREATHING

Tilt the head back to open the airway. Check for breathing (*see page 56*).

IF the child is breathing, place her in the recovery position (*see page 56*).



RESCUE BREATHING

Look into the mouth and clear any *obvious* obstruction. For a child, keep the head tilted back, pinch the nose, and give two breaths of mouth-to-mouth rescue breathing (*see page 57*). For a baby, keep the head tilted back and breathe into the mouth and nose (*see page 57*).



ASSESS FOR CIRCULATION

Check for signs of circulation (normal breathing, coughing, or movement). If any is present, continue to support breathing. If all are absent, begin CPR (*see page 58*).

COMMENCE CPR

Alternate five chest compressions with one breath of artificial respiration (*see page 58*) for one minute (approximately 10 cycles), before calling EMS.



WHEN TO CALL EMS

IF you have a helper, he or she should call EMS while you treat the child.

IF you are alone, give one minute of CPR

if pulse is absent, or one minute of rescue breathing if pulse is present, before calling EMS. Continue the treatment.

THE RESUSCITATION SEQUENCE

CHECK
RESPONSEOPEN AIRWAY AND
CHECK BREATHINGRESCUE
BREATHINGASSESS FOR
CIRCULATIONCOMMENCE
CPR

CHECKING RESPONSE

BABY (UNDER ONE) AND CHILD (AGED 1-7)

■ For a child: Stimulate her to establish whether she is unconscious. Talk to her or very gently shake her shoulders.

IF unconscious, she won't respond.

IF there is no response, shout for help.

■ For a baby: Gently tap or flick the sole of his foot to see if he responds.

IF there is no response, shout for help.

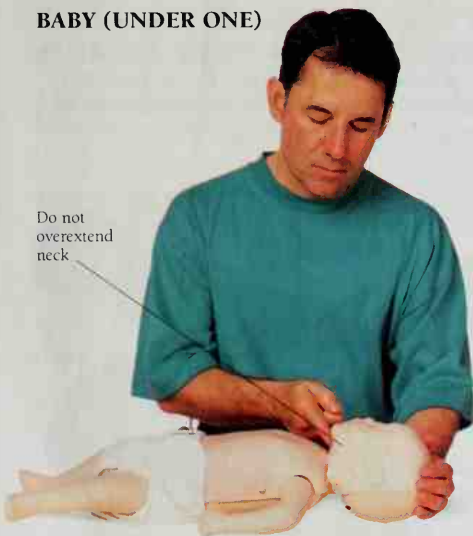
Never shake a baby.



OPENING THE AIRWAY

BABY (UNDER ONE)

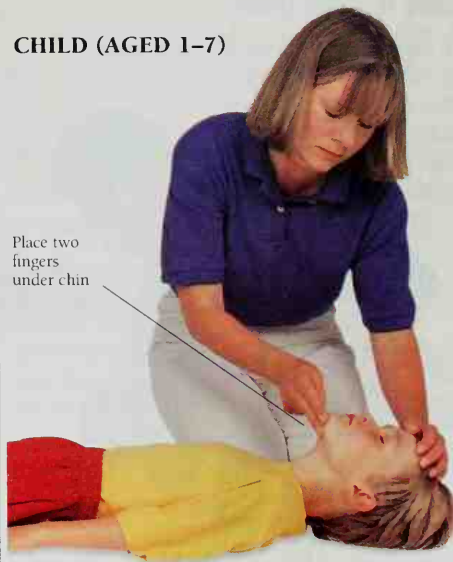
Do not
overextend
neck



Use one finger to lift the chin. Place the other hand on the baby's head and tilt it back slightly.

CHILD (AGED 1-7)

Place two
fingers
under chin



Use two fingers to lift the chin. Place the other hand on the child's forehead and tilt the head back.

THE RESUSCITATION SEQUENCE

CHECK
RESPONSEOPEN AIRWAY AND
CHECK BREATHINGRESCUE
BREATHINGASSESS FOR
CIRCULATIONCOMMENCE
CPR

CHECKING BREATHING

FOR BOTH BABY (UNDER ONE) AND CHILD (AGED 1-7)

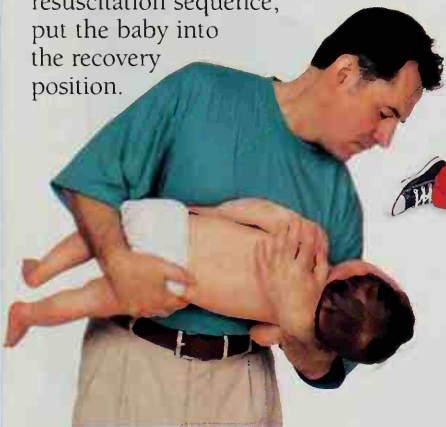
- 1 Listen for sounds of breathing; feel for breath on your cheek; and look along the chest for movement.
- 2 Check for up to ten seconds before deciding that breathing is absent.

Lean down
over victimLook for chest
movement,
indicating
breathing

THE RECOVERY POSITION

BABY (UNDER ONE)

IF breathing and pulse are present, or return at any point during the resuscitation sequence, put the baby into the recovery position.

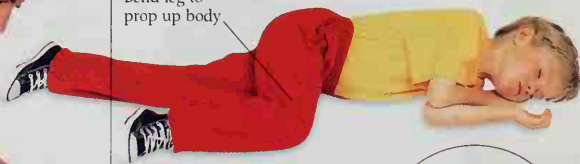


Technique for a baby

The recovery position technique for a baby is to cradle him in your arms with his head tilted downward. This prevents him from choking on his tongue or inhaling vomit.

CHILD (AGED 1-7)

IF breathing and pulse are present, or return at any point during the resuscitation sequence, place the child in the recovery position to stop him from choking on his tongue or inhaling vomit.

Bend leg to
prop up bodyEnsure that
head is
tilted back

Technique for a child

Place a child into the recovery position in the same way you would an adult (see page 48). The airway should be opened before you begin turning the child, and then rechecked once the turn is complete, to ensure that the child is able to breathe properly.



RESCUE BREATHING

BABY (UNDER ONE YEAR)

1 Carefully remove any *obvious* obstruction from the mouth. Seal your lips tightly around the baby's mouth and nose and breathe into the lungs.



2 Give five breaths of mouth-to-mouth and nose rescue breathing, aiming for one complete breath every three seconds. Check the brachial pulse (*see below*) and look for other signs of recovery, such as coughing, swallowing, or breathing.

CHILD (AGED 1-7)

1 Carefully remove any *obvious* obstruction from the mouth. Pinch the child's nostrils closed. Seal your lips around his mouth and breathe into the lungs until the chest rises.



2 Give five breaths, aiming at one breath every three seconds. Check the pulse and look for other signs of circulation.

ASSESS FOR CIRCULATION

Check for signs of circulation (normal breathing, coughing, or movement).

If any is present, continue to support breathing. If all are absent, begin CPR.

FOR BOTH BABY (UNDER ONE) AND CHILD (AGED 1-7)

IF there are no signs of recovery (*see above*), give CPR by alternating five chest compressions (*see page 58*) with one breath of artificial respiration for one minute before calling EMS.

IF signs of circulation are present, continue rescue breathing every three seconds for one minute before calling EMS. **IF** breathing starts, stop rescue breathing and place the baby or child into the recovery position (*see opposite*).

CARDIOPULMONARY RESUSCITATION (CPR)

If a child appears lifeless and you cannot see signs of circulation, you must begin cardiopulmonary resuscitation (CPR). If you are alone, give CPR for one minute

before going for help. The technique used depends on the child's age and size. The table below outlines the technique for each age group.

GUIDELINES FOR CPR ON CHILDREN

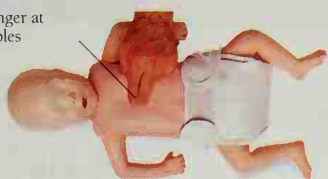
Should you have doubts about which technique to use, follow this general rule: if you have to move from the chest to reach

the head for mouth-to-mouth respiration, the child is big enough for you to perform adult resuscitation (see page 45).

Age	Chest compressions	Rescue breaths
Under one	5 (with two fingers)	1 (on mouth and nose)
1-7	5 (with one hand)	1 (on mouth only)
8 or over (treat as for an adult)	15 (with two hands)	2 (on mouth only)

BABY (UNDER ONE YEAR)

Place this finger at level of nipples



1 With the baby on her back on a flat surface, place your index finger at the level of the nipples and your middle finger next to it. Press down firmly to a depth of $\frac{1}{2}$ to 1 in. the chest. Do this five times at a rate of 100 per minute.

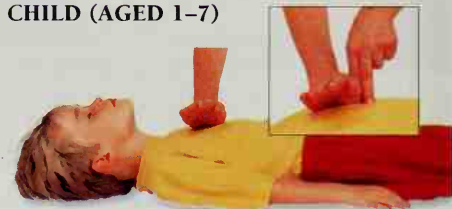


Cover baby's mouth and nose

2 Give one full breath of artificial respiration, by breathing into the baby's mouth and nose (see page 57).

3 Alternate five chest compressions to one breath of artificial respiration for one minute before calling EMS. Continue CPR while waiting for help.

CHILD (AGED 1-7)



1 Position your hand as you would for an adult (see page 52), but use the heel of one hand only to press down firmly at this point 1 to $1\frac{1}{2}$ in. Do this five times at a rate of 100 per minute.



Tilt chin

2 Give one full breath of artificial respiration, by breathing into the child's mouth (see page 57).

3 Alternate five chest compressions to one breath of artificial respiration for one minute before calling EMS. Continue while waiting for help.

DISORDERS OF THE RESPIRATORY SYSTEM 5

Oxygen is essential to support life. The action of breathing enables air containing oxygen to be taken into the lungs, so that the oxygen can be transferred to the blood and circulated throughout the body. The action of breathing and the process of gas exchange in the lungs are together commonly described as “respiration,” and the organs, tissues, and structures that enable us to breathe as the “respiratory system” (see page 60).

What can go wrong

Respiration can be impaired in various ways: by obstruction of the airway, for example, as in choking or drowning; by preventing normal exchange of gases in the lungs, such as in fume or smoke inhalation; or by conditions affecting the function of the lungs, for instance as with a collapsed lung, or by affecting the mechanism of breathing, as in asthma. Disorders affecting respiration always require urgent first aid and may be life threatening.

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FIRST-AID PRIORITIES

- ◆ Recognize respiratory distress.
- ◆ Restore and maintain the person's breathing and, if necessary, apply the ABC of resuscitation, and be prepared to resuscitate if necessary.
- ◆ Identify and remove the cause of the problem, and provide fresh air.
- ◆ Obtain appropriate medical aid. Anyone who has experienced severe difficulties with the airway or breathing *must* be seen at a hospital, even if first aid seems to have been successful.

THE RESPIRATORY SYSTEM

This system comprises the mouth, nose, windpipe (*trachea*), lungs, and pulmonary blood vessels. Respiration involves the process of breathing and the exchange of gases (oxygen and carbon dioxide) in the lungs (see below) and in cells throughout the body (see page 76).

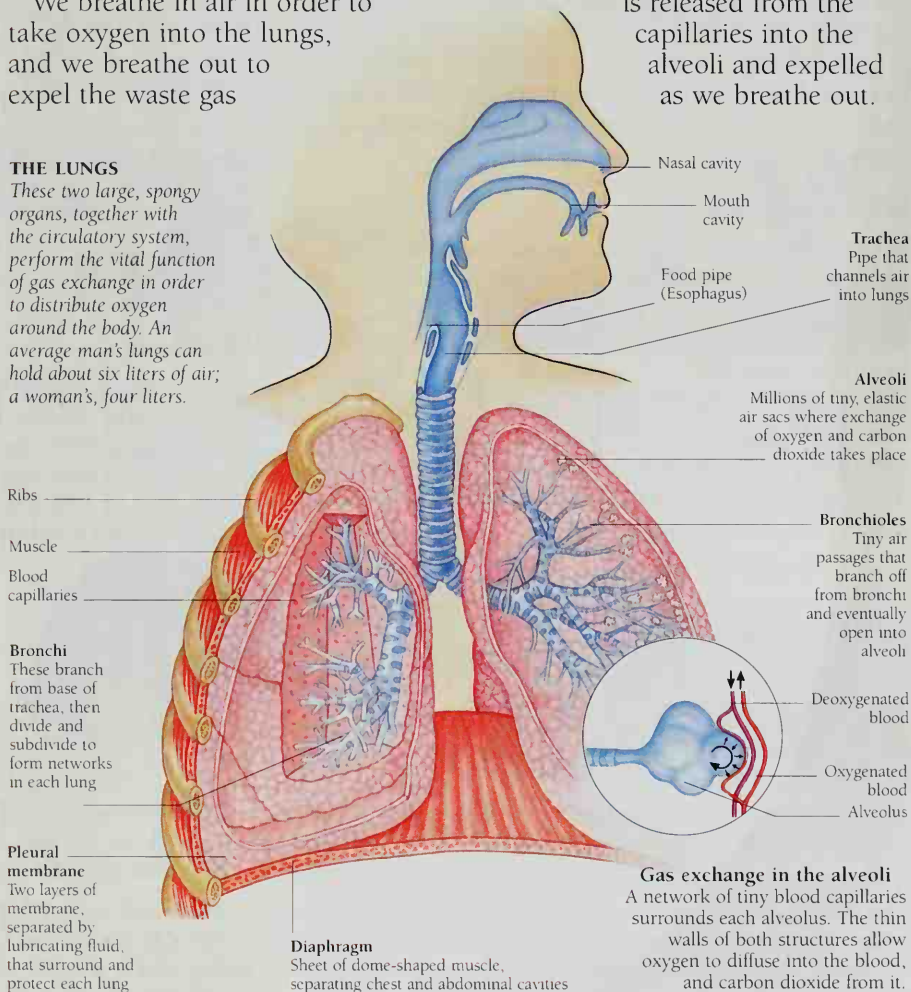
We breathe in air in order to take oxygen into the lungs, and we breathe out to expel the waste gas

carbon dioxide, a byproduct of respiration. When we breathe, air is drawn through the nose and mouth into the airway and the lungs.

In the lungs, oxygen is taken from air sacs (*alveoli*) into tiny blood vessels (*pulmonary capillaries*). At the same time, carbon dioxide is released from the capillaries into the alveoli and expelled as we breathe out.

THE LUNGS

These two large, spongy organs, together with the circulatory system, perform the vital function of gas exchange in order to distribute oxygen around the body. An average man's lungs can hold about six liters of air; a woman's, four liters.



THE PROCESS OF BREATHING

Breathing is controlled by the brain through the autonomic nervous system (see page 108), a system that also helps monitor the levels of oxygen and carbon dioxide in the blood.

The average adult normally breathes about 16 times per minute; children breathe about 20–30 times per minute. The rate can be altered (usually increased) by the respiratory center

in the brain as a response to abnormal levels of oxygen or carbon dioxide, stress, exercise, injury, or illness. The body can also change the depth and the rate of breathing voluntarily.

The breathing process consists of breathing in (*inspiration*), breathing out (*expiration*), and a pause. There is always some air left in the lungs so that oxygen is constantly available to the blood.

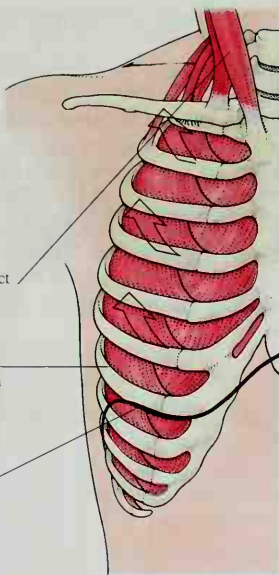
Breathing in

The muscles contract to expand the chest cavity and the lungs fill the space. The alveoli (see opposite) open up and suck in air via the trachea.

Neck muscles contract

Ribs move upward and outward through muscular action

Diaphragm contracts and flattens

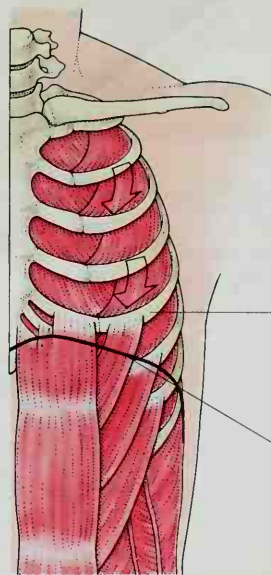


Breathing out

The muscles relax and the elastic chest wall returns to its resting position. This forces out air from the lungs.

Ribs fall downward and inward as muscles relax

Diaphragm rises to regain its resting domed shape



WHAT CAN GO WRONG

- ◆ Chronic disease of the lungs, such as *emphysema*, which affects the alveoli, can cause shortness of breath and eventually respiratory failure.
- ◆ Allergic reactions may affect only the respiratory tract, as in hay fever, when inflamed nasal membranes lead to congestion and sneezing, or constriction of the breathing tubes, shortness of breath, and wheezing.
- ◆ Infections cause inflammation of the windpipe (see Croup, page 74), bronchi

(*bronchitis*), and lung tissue (*pneumonia*), causing coughing and phlegm production.

- ◆ Infections and other conditions, such as *pleurisy*, can affect the two layers of pleural membrane that cover the lungs, making breathing painful.

◆ Other conditions that lead to breathing difficulties include hyperventilation (see page 72), pneumothorax (see page 94), asthma (see page 73), and anaphylactic shock (see page 81).

DISORDERS OF RESPIRATION

Any disturbance of the respiratory process is potentially fatal, since it may lead to suffocation (*see opposite*); a condition caused not only by smothering, but also by any condition that stops oxygen being taken up from the lungs by the blood.

The depletion of oxygen in the body is known as *hypoxia*. In this state, the tissues begin to deteriorate rapidly – brain cells will start to die if their oxygen supply is interrupted for as little as four minutes.

Symptoms of low blood oxygen

- ◆ Rapid, distressed breathing and gasping for breath.
- ◆ Confusion and aggression, leading to unconsciousness.
- ◆ Usually, gray-blue skin (*cyanosis*).
- ◆ Breathing or the heart may stop if hypoxia is not swiftly reversed.

ABOUT OXYGEN

- ◆ The air we breathe contains 21% oxygen. Medical conditions resulting in oxygen depletion can often be improved by adding oxygen to the inhaled air. Giving oxygen requires specialized equipment, which should only be used by people trained in its use.
- ◆ Oxygen therapy is used by medical personnel to supplement artificial respiration (*see page 50*) or to enrich inhaled air for people suffering from heart and lung diseases or for victims of smoke inhalation (*see page 70*).
- ◆ Oxygen can be self-administered at home, and is used by people with certain severe respiratory diseases. Portable oxygen equipment is widely available, allowing much greater activity for people requiring added oxygen to breathe.
- ◆ Oxygen feeds fires. Smoking or open flames must be kept far away when oxygen is in use.

CONDITIONS CAUSING LOW BLOOD OXYGEN (HYPOXIA)

Condition	Causes
Insufficient oxygen in inspired air	• Suffocation by smoke or gas • Changes in atmospheric pressure, for example at high altitude or in a depressurized aircraft
Airway obstruction	• Suffocation by an external obstruction, such as a pillow or water (drowning) • Blockage or swelling in the air passages • Compression of the windpipe, for example caused by hanging or strangulation
Conditions affecting the chest wall	• Crushing, for example by a fall of earth or sand or pressure from a crowd • Chest wall injury with multiple rib fractures or constricting burns
Impaired lung function	• Lung injury • Collapsed lung • Lung infections, such as pneumonia
Damage to the brain or nerves that control respiration	• A head injury, or stroke, that damages the breathing center in the brain • Some forms of poisoning • Paralysis of nerves controlling the muscles of breathing, as in spinal cord injury
Impaired oxygen uptake by the tissues	• Poisoning by carbon monoxide or cyanide

AIRWAY OBSTRUCTION

The airway may be obstructed by food, vomit, or some other foreign material, by swelling of the throat after injury, or smoke inhalation, constriction around the neck, or in an unconscious victim, by the tongue. A child may inhale a foreign body that can then block the lower air passages, or swell within the lung, possibly resulting in a collapsed lung (see page 94) or in pneumonia.

General signs and symptoms

- ◆ Noisy, labored breathing.
- ◆ Gray-blue skin (*cyanosis*).
- ◆ Flaring of the nostrils.
- ◆ Reversed movement of the chest while breathing: the chest wall will suck in as the victim breathes in.
- ◆ Drawing in of the chest wall between the ribs and of the soft spaces above the collar bones and breastbone.

SUFFOCATION

The medical term for this condition is *asphyxia*. Suffocation is often thought to result from a physical barrier to the airway, and associated with smothering.

In fact, suffocation occurs when life is threatened because the breath is deficient in oxygen. Suffocation can therefore result not just from an airway obstruction, but also from contamination of the air with, for example, gases such as carbon monoxide that interfere with the ability of the blood to absorb oxygen.

See also:

Inhalation of Gases, page 70.

See also:

Burns to the Airway, page 162.
Drowning, pages 26 and 68.
Inhaled Foreign Bodies, page 182.
Opening the Airway, page 47.
Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To restore a supply of fresh air to the victim's lungs.
- To seek medical aid.

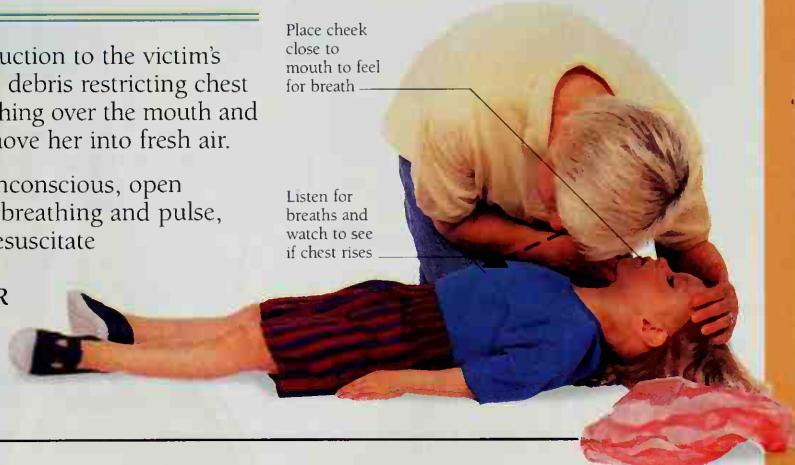
Remove any obstruction to the victim's breathing, such as debris restricting chest movement or anything over the mouth and nose. If needed, move her into fresh air.

If the victim is unconscious, open the airway, check breathing and pulse, and be ready to resuscitate (see pages 44–58).

☎ DIAL 9-1-1 OR CALL FOR EMS.

Place her in the recovery position (see page 48).

If the victim is conscious, reassure her, but keep her under observation. Call a doctor, even if she seems to have recovered completely.



CHOKING

A foreign object that is stuck at the back of the throat may either block the throat or induce muscular spasm. This is choking. Adults may choke on food that has been inadequately chewed and hurriedly swallowed. Young children and babies are curious and like putting objects in their mouths. Choking requires *immediate action*; be prepared to resuscitate if the victim stops breathing.

TREATMENT

YOUR AIMS ARE:

- To remove the obstruction and so restore normal breathing.
- To call EMS.

FOR A CONSCIOUS ADULT

Listen to see if choking person can speak or cough



1 Ask the person "Are you choking?" If the person can speak or cough, there is no need to interfere. If the person cannot speak or cough, then you should proceed to Step 2.

Recognition

- ◆ Difficulty in speaking and breathing.

There may also be:

- ◆ Congested face initially.
- ◆ Gray-blue skin (*cyanosis*) later.
- ◆ Distressed signs from the victim, who may point to the throat, or grasp the neck.

See pages 66–7 for Choking Baby or Child

2 Give abdominal thrusts (the "Heimlich Maneuver"). Stand behind the person and put your arms around her. Link your hands below the ribcage and pull sharply inward and upward. The obstructing object may be expelled by the force of the thrust.

Stand behind person



Make fist with one hand and position with thumb side against abdomen, then grasp fist with other hand



3 Continue abdominal thrusts until the obstruction clears, or the person becomes unconscious.

IF the person becomes unconscious, lay her face up on the floor and treat as described opposite.

FOR AN UNCONSCIOUS ADULT



1 While holding the victim's chin with your fingers, place your thumb inside the choking person's mouth to hold his tongue. Holding the tongue and jaw firm, lift the jaw. With your other hand, use your index finger as a hook to remove any foreign body from the person's mouth.



2 Open the person's airway (see page 47) by placing two fingers under his chin and one hand on his forehead. Gently tilt the head back and attempt to ventilate. If blockage remains, reposition the head and try again. If you still cannot give rescue breaths, begin CPR.



3 Kneel beside the victim and place your hands, one on top of the other, on the middle of his chest (see page 52).

IF, at any stage, the person begins to breathe normally, place him in the recovery position (see page 48).

☎ DIAL 9-1-1 OR CALL EMS.

Monitor and record breathing, pulse, and level of response every ten minutes.



4 Perform chest compressions as for CPR (see pages 52–3). Repeat steps 1 and 2 after each series of 15 compressions, until food is ejected, rescue breathing is successful, or the victim starts to breathe again on his own.

CHOKING FOR CHILDREN

FOR A CONSCIOUS BABY (0-12 months)

IF the baby cannot cough or breathe and starts to turn blue, perform the choking sequence.



1 Lay the baby face down on your forearm, supporting his head and chest. Give up to five sharp blows on his back.

2 Check the baby's mouth; remove any obvious obstruction with one finger.

DO NOT feel blindly down the throat.

Push downwards one finger's breadth below nipple line with your fingertips



3 If this fails, use two fingers to give the baby up to five chest thrusts.

4 Check the baby's mouth again and remove any obvious obstruction.

DO NOT use abdominal thrusts on a baby.

5 If the obstruction still has not cleared, repeat Steps 1-4 three times, then **☎ DIAL 9-1-1 OR CALL EMS.** Repeat Steps 1-4 until help arrives.

FOR A CONSCIOUS CHILD (1-7 years)

1 Ask the child, "Are you choking?" If the child can speak or cough, do not interfere. If the child cannot speak or cough, proceed to Step 2.



Thumb-side of fist against abdomen

2 Wrap your arms around the child's abdomen just above the hips. Make a fist with one hand and place the thumb side of your fist against the middle of her abdomen, just above her navel.



3 Grasp your fist with your other hand and then press into her abdomen with a quick upward thrust.

Thumb side of fist midway between navel and breastbone

4 Continue to give abdominal thrusts until the obstruction clears, or until the child becomes unconscious.

5 **☎ DIAL 9-1-1 OR CALL EMS.**

IF the child becomes unconscious, treat him as described opposite.



FOR AN UNCONSCIOUS CHILD (1–7 years)

IF you have a helper, tell him or her to

☎ DIAL 911 OR CALL EMS.



1 While holding the child's chin with your fingers, place your thumb inside her mouth to hold her tongue. Holding the tongue and jaw firm, lift the jaw. With your other hand, use your index finger as a hook to remove any foreign body from the mouth.



Listen for sounds of breathing and look for chest movement

2 Open the child's airway (*see page 47*) by placing two fingers under her chin, lifting her jaw, and tilting the head back. Attempt to ventilate. If the blockage still remains, reposition the head and try again. If the child still cannot breathe, begin CPR (step 3).



3 Kneel beside the victim and place one hand on the middle of her chest (*see page 52*). Perform chest compressions as for CPR (*see page 54*).

4 Repeat steps 1 and 2 after each set of five compressions, until food is ejected, rescue breathing is successful, or the victim starts to breathe again on her own.

ASSESSING TREATMENT

Carry out the following checks every time you complete steps 2, 3, or 4 before going on to the next one.

◆ Check the mouth and remove any *obvious* obstruction with one finger.

DO NOT use your fingers to feel blindly down the throat.

◆ If the child begins to breathe, place her in the recovery position (*see page 56*).

◆ If the child is still not breathing, attempt to give up to two breaths of mouth-to-mouth ventilation (*see page 57*).

◆ If her chest does not rise when you try to ventilate, proceed to Steps 3 and 4.

DROWNING

Death by drowning normally occurs when air cannot get into the lungs. This usually happens because water enters the lungs, but drowning may also be caused by throat spasm.

The water that often gushes out of a rescued victim's mouth is from the stomach, and should drain naturally. Attempts to force water from the stomach may result in the stomach contents being inhaled. A near-drowning victim should

always receive medical attention. Any water entering the lungs causes irritation and, even if the victim seems to recover at the time, the air passages may begin to swell (secondary drowning) some hours later. A near-drowning victim may also need to be treated for hypothermia.

See also:

Hypothermia, *page 170.*

Rescue from Drowning, *page 26.*

TREATMENT

YOUR AIMS ARE:

- To restore adequate breathing.
- To keep the victim warm.
- To arrange removal to the hospital.

1 If carrying the victim from the water to safety, keep her head lower than the rest of the body to reduce the risk of inhaling water.

Tilt head to listen for breathing



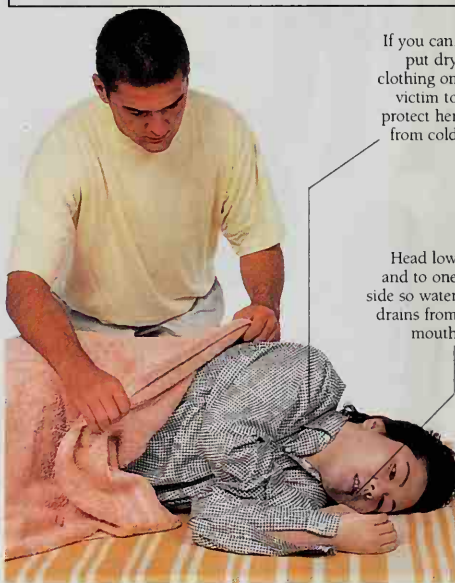
2 Lay her down on her back on a coat or rug. Open the airway and check breathing; be prepared to resuscitate if necessary (*see pages 44–58*).

IF resuscitating, be aware that water in the lungs and the effects of cold can increase resistance to artificial respiration and chest compression, so you may have to do both at a slower rate than normal.

DO NOT use the abdominal thrust unless the victim's airway is obstructed and artificial respiration has failed.

If you can, put dry clothing on victim to protect her from cold

Head low and to one side so water drains from mouth



3 Treat the victim for hypothermia: remove wet clothing and protect her from cold. Place her in the recovery position (*see page 48*). If she regains full consciousness, give her hot drinks.

☎ DIAL 9-1-1 OR CALL EMS

HANGING AND STRANGULATION

If pressure is exerted on the outside of the neck, the airway is squeezed and the flow of air to the lungs is cut off. The three main causes of such pressure are:

- ◆ *hanging*, suspension of the body by a noose around the neck;
 - ◆ *strangulation*, constriction around neck.
- Hanging and strangulation may occur accidentally, for example, by a drawstring in a child's clothing caught on a playground slide. Hanging may also cause a broken neck, so the victim must be handled carefully.

Recognition

There may be:

- ◆ A constricting article around the neck.
- ◆ Marks around the victim's neck where a constriction has been removed.
- ◆ Rapid, distressed breathing; impaired consciousness; gray-blue skin (*cyanosis*).
- ◆ Congestion of the face, with prominent veins and, possibly, tiny red spots on the face or on the whites of the eyes.

See also:

Spinal Injury, page 143.

TREATMENT

YOUR AIMS ARE:

- To restore adequate breathing.
- To arrange removal to the hospital.



DO NOT move the victim unnecessarily in case of spinal injury.

DO NOT destroy or interfere with any material, such as knotted rope, that police may need as evidence.

IF she is not breathing, be prepared to resuscitate (*see pages 44–58*).

IF it is necessary to move her, assume that there is a spinal injury. Maintain the head and neck in the neutral position and use the log-roll technique (*see page 145*) to reposition her.



1 Quickly remove any constriction from around the victim's neck. Support the body while you do so if it is still hanging.

2 Carefully lay the victim on the floor, supporting the head and neck at all times. Open the airway (*see page 47*), keeping the head and neck in the neutral position. Check for breathing and pulse.

IF she is breathing, place her in the recovery position (*see page 48*).

3 **DIAL 9-1-1 OR CALL EMS**, even if she appears to recover fully.

INHALATION OF GASES

The inhalation of smoke, gases, or toxic vapors can be lethal, so you should not make a rescue attempt if it puts your own life at risk. Smoke or gases that have accumulated in a confined space may quickly overcome anyone who is not wearing protective equipment. A burning building presents additional hazards – not only the fire itself, but also, possibly, falling masonry or timber.

Smoke inhalation

Any person who has been enclosed in a confined space during a fire should be assumed to have inhaled smoke. Smoke from burning plastics, foam padding, and synthetic wall coverings will probably contain poisonous

gases. Victims also should be examined for other injuries sustained as a result of the fire.

Carbon monoxide

This highly dangerous gas prevents the blood from carrying oxygen. A large amount in the air can very quickly prove fatal. Lengthy exposure to a small amount of gas – for example, a slow leak from a faulty gas heater – may also cause severe, possibly fatal, poisoning. Take care if you suspect a leak of carbon monoxide – it has no taste or smell.

See also:

Burns to the Airway, *page 162.*

Fires, *page 22.*

Unconsciousness, *page 110.*


THE EFFECTS OF GAS INHALATION

Gas	Source	Effects
Carbon monoxide	Exhaust fumes of motor vehicles; smoke from most fires; back-draughts from blocked chimney flues; emissions from defective gas heaters	<ul style="list-style-type: none"> • Chronic exposure may produce headache, confusion, aggression, nausea, vomiting, and incontinence • Acute poisoning may produce a dusky skin with a faint red tinge, rapid, distressed breathing, and impaired consciousness leading rapidly to unconsciousness
Smoke	Fires: smoke is a bigger killer than fire itself. Smoke is low in oxygen (which is used up by the burning of the fire) and may contain toxic gases from burning materials	<ul style="list-style-type: none"> • Irritation of the air passages causing spasm and swelling, resulting in rapid, noisy, distressed breathing, with coughing and wheezing • Unconsciousness • Burning in or around the nose or mouth • Soot around the mouth and nose
Carbon dioxide	Tends to become dangerously concentrated in deep enclosed spaces such as coal mines, wells, and underground tanks	<ul style="list-style-type: none"> • Breathlessness • Headache • Depleted oxygen in the blood, leading rapidly to confusion and unconsciousness
Solvents and fuels	Glues; cleaning fluids; lighter fuels; camping gas and propane-fueled stoves. Abusers may use a plastic bag to concentrate the vapor (especially with glues)	<ul style="list-style-type: none"> • Headache • Vomiting • Stupor and unconsciousness • Death can be caused by asphyxiation by a plastic bag (if an abuser), choking on vomit, or cardiac arrest • Some fuels when discharged from containers are very cold, and can, if inhaled, lead to cardiac arrest

TREATMENT

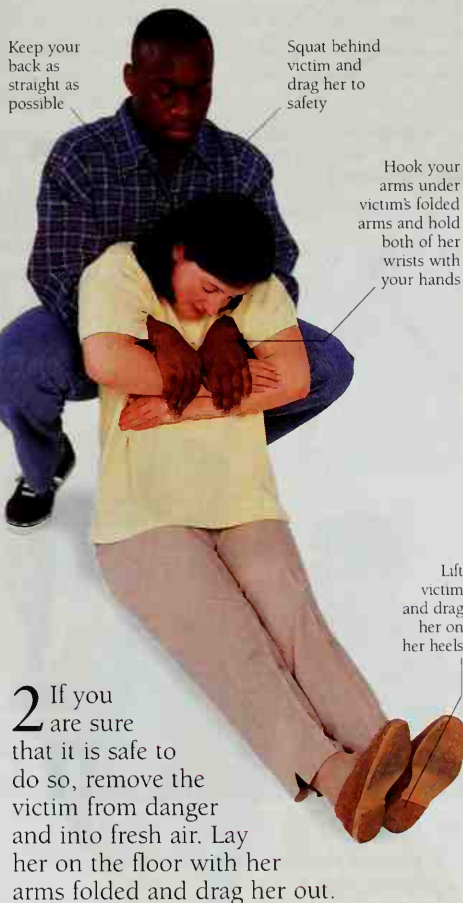
YOUR AIMS ARE:

- To restore adequate breathing.
- To obtain urgent medical attention and call the emergency services.

1  **DIAL 9-1-1 OR CALL EMS,** asking for both fire and ambulance emergency services.

IF entering a garage filled with carbon monoxide, open the doors wide and let the gas escape before entering.

IF victim's clothing is still burning, extinguish the flames (*see page 23*).



DO NOT enter a gas- or smoke-filled room without proper safety equipment.

Listen for breathing and look to see if chest rises



IF the victim is unconscious, open the airway, check breathing and pulse, and be ready to resuscitate if needed (*see pages 44–58*). Place her in the recovery position (*see page 48*).

Make sure mask covers nose and mouth



3 Give oxygen if it is available, and you have been trained in its use. Treat any burns (*see pages 155–66*) or other injuries.

4 Stay with the victim until medical help arrives. Monitor and *record* her breathing, pulse, and level of response every ten minutes.

BREATHING DIFFICULTIES

These may be caused by chronic illness, by respiratory system infections such as croup, and by allergic reactions, either respiratory or generalized. Labored breathing can also occur in medical conditions that are not directly connected with the respiratory system. Sudden attacks of breathlessness may result from asthma or psychological stress (*hyperventilation*). Prompt first aid can do much to help a person's breathing, and ease distress.

See also:

Anaphylactic Shock, page 81.

COLLAPSED LUNG

If air enters the space between a lung and the chest wall, it may affect breathing and cause the lung to collapse (*pneumothorax*). This can occur because of a lung weakness or chest injury. Sometimes the pressure affects the action of the good lung and the heart (*tension pneumothorax*). This condition is life-threatening and a medical emergency.

If you suspect a collapsed lung, help the victim into the position in which he or she can breathe most easily, and dial 9-1-1 or call EMS without delay.

See also:

Penetrating Chest Wounds, page 94.

HYPERVENTILATION

Excessive breathing (hyperventilation) is commonly a manifestation of acute anxiety and may accompany hysteria or a panic attack. It may be seen in susceptible individuals who have recently been frightened or stressed.

Excessive breathing decreases carbon dioxide levels and causes chemical changes that produce the symptoms of this condition. As breathing returns to normal, the person will begin to recover.

Recognition

- ◆ Unnaturally fast, deep breathing.

There may also be:

- ◆ Attention-seeking behavior.
- ◆ Dizziness, faintness, trembling, or marked tingling in the hands.
- ◆ Cramps in the hands and feet.

See also:

Hysteria, page 212.

TREATMENT

YOUR AIM IS:

- To remove the person from any cause of distress and calm him down.

- 1 Quietly reassure the person and encourage him to try to slow down his breathing.
- 2 If possible, lead the person away to a quiet place, where he may be better able to regain control of his breathing.



- 3 Seek medical attention. Sometimes certain medical conditions can cause rapid breathing.

ASTHMA

This is a distressing condition in which the muscles of the air passages go into spasm and the linings of the airways swell. This results in narrowing of the airways, making breathing difficult.

Sometimes there is a recognized trigger for an asthmatic attack, such as an allergy, a cold, a drug, or cigarette smoke. At other times, no obvious trigger can be identified. Many sufferers are prone to sudden attacks at night.

Asthmatics usually deal with their own attacks. Many carry inhalers that they use regularly to prevent or relieve attacks. The drugs in inhalers dilate the air passages, easing breathing. Plastic diffusers, or "spacers," can be fitted to help both

children and adults breathe in the medication.

Recognition

- ◆ Difficulty in breathing, with a very prolonged breathing-out phase.

There may also be:

- ◆ Wheezing during breathing.
- ◆ Distress and anxiety.
- ◆ Difficulty in speaking and whispering.
- ◆ Gray-blue skin (cyanosis).
- ◆ Dry, tickly cough.
- ◆ In a severe attack, the asthmatic may be exhausted. He or she may become unconscious and stop breathing.

TREATMENT

YOUR AIMS ARE:

- To ease breathing.
- To seek medical aid.

1 Keep calm and reassure the person. Asthma can be frightening but a reliever inhaler usually works within a few minutes.

Use a spacer with the inhaler, if she has one



2 Let the person adopt the position that she finds most comfortable. It is not unusual for an asthmatic to feel better when sitting down.

DO NOT make the person lie down.

DO NOT try to use a preventer inhaler to help relieve an asthma attack.

IF the attack is mild and eases within 5–10 minutes, ask her to take another dose from the same inhaler. She should let her doctor know about the attack.

IF this is the first attack, or if it is severe, and

- ◆ the inhaler has no effect after 5–10 minutes;
 - ◆ breathlessness makes talking difficult;
 - ◆ she is getting exhausted;
- ☎ DIAL 9-1-1 OR CALL EMS.**

Help her use her inhaler every 5–10 minutes. Monitor and *record* her breathing and pulse every ten minutes.

IF the person stops breathing or loses consciousness, open the airway, check breathing and pulse, and be ready to resuscitate if necessary (see pages 44–58).

☎ DIAL 9-1-1 OR CALL EMS.

CROUP

An attack of severe breathing difficulty in very young children is known as croup. It is caused by inflammation in the windpipe and larynx. Croup can be alarming, but usually passes without lasting harm. It usually occurs at night and may recur before the child settles.

If the attack of croup persists or is very severe, and is accompanied by fever, call an ambulance. There is a small risk that the child may be suffering from a rare, crouplike condition called *epiglottitis*.

In this condition, a small flaplike structure in the throat, the epiglottis (see page 42) becomes infected and swollen, sometimes so much so that it blocks the airway completely. The child then requires urgent medical attention.

Recognition

- ◆ Distressed breathing in a young child.

There may also be:

- ◆ A short, barking cough.
- ◆ A crowing or whistling noise, especially on breathing in (*stridor*).
- ◆ Blue-gray skin (*cyanosis*).
- ◆ In severe cases, the child will be using muscles around the nose, neck, and upper arms in trying to breathe.

Suspect epiglottitis if:

- ◆ An older child is sitting bolt upright, evidently in severe respiratory distress.
- ◆ The child has a high temperature.
- ◆ The child cannot even swallow saliva.

TREATMENT

YOUR AIMS ARE:

- To comfort and support the child.
- To seek medical advice.



1 Sit the child up, supporting her back, and reassure her.

2 Create a steamy atmosphere: take the child into the bathroom and run the hot faucet or shower, or into the kitchen and boil some water. Sit her down and encourage her to breathe in the steam to ease her breathing. *Take care* to keep the child clear of the running hot water.

DO NOT panic; you will alarm the child and worsen the attack.

3 If a child's breathing is not relieved, take her out into the cool air until her breathing stabilizes. When the attack has passed and the child is put back to rest, create a humid atmosphere in her bedroom. The humidity may prevent the attack from recurring.

4 Call your doctor and advise him or her of the attack.

DISORDERS OF CIRCULATION

6

The heart and network of blood vessels, which are together known as the circulatory (or *cardiovascular*) system, work constantly to keep all parts of the body supplied with blood, which carries vital oxygen and nutrients.

The circulatory system can fail for two main reasons: severe bleeding and fluid loss may cause the volume of circulating blood to fall, and deprive the vital organs, primarily the brain, heart, and lungs, of oxygen; and secondly, age or disease can cause the body's circulatory system to break down.

First-aid techniques

The techniques described in this chapter demonstrate how to improve the blood supply to the heart and brain. In minor incidents, for example when an injured person faints, appropriate first aid should ensure recovery; in serious cases such as heart attack, your role may be vital in preserving life until medical aid arrives.

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FIRST-AID PRIORITIES

- ◆ Position the injured to improve the blood supply to the vital organs.
- ◆ Take any additional measures to improve the circulation and breathing – for example, loosening any tight clothing.
- ◆ Comfort and reassure the injured; fear and panic will put extra strain on the heart.
- ◆ Obtain appropriate medical assistance. Always advise the injured to inform his or her doctor of, for example, an angina attack or unexplained faint; never hesitate to call 9-1-1 or EMS if you suspect a more serious emergency.

THE CIRCULATORY SYSTEM

The heart and blood vessels form the circulatory system. Blood flows around the body constantly, pumped by the rhythmic contraction and relaxation, or beat, of the heart muscle. Blood runs in a network of blood vessels divided into three types: arteries, veins, and capillaries. The force

exerted by the blood flow through the main arteries is called blood pressure. This force varies with the strength of the heartbeat, the elasticity of the arterial walls, and the volume and thickness of the blood.

The circulating blood brings oxygen and nutrients to the tissues and carries waste products away.

HOW BLOOD CIRCULATES

Oxygenated blood is pumped out of the heart around the body. Blood that has given up its oxygen to body tissues flows back to the heart.

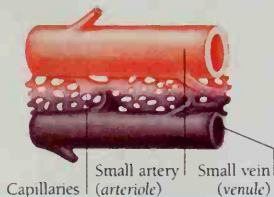
Aorta
Largest artery of body

Arteries
Strong, muscular, elastic walls enable arteries to expand with each surge of blood away from heart and toward tissues

Veins
Action of muscles around these thin-walled vessels squeezes blood through them, and one-way valves keep it flowing back toward heart

Gas exchange in the tissues

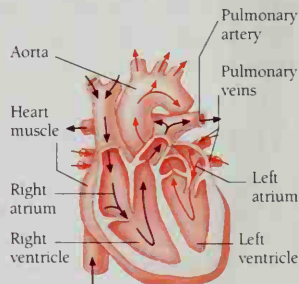
A network of fine blood vessels (capillaries) within the body tissues forms a link between the arteries and veins. The capillaries have thin walls and a slower blood flow to allow oxygen and nutrients to pass from the blood to the tissues, and waste products to be removed.



Blood flow through the heart

With each beat of the heart (see page 43), deoxygenated blood from the veins enters the right collecting chamber (atrium) and flows into the right pumping chamber (ventricle). Then the thick-walled ventricle contracts to force the blood via the pulmonary artery to the lungs (see page 60).

At the same time, oxygenated blood returns from the lungs, via the pulmonary veins, into the left atrium. It then passes into the left ventricle, to be pumped out to the body through the aorta.



KEY

- Direction of blood flow
- Oxygenated blood
- Deoxygenated blood

COMPOSITION OF THE BLOOD

The average human adult body contains about 10 pints (6 liters) of blood. The blood consists of roughly 60% clear yellow fluid (*plasma*) in which are suspended the red and white blood cells and platelets that make up the other 40%.



The blood cells

Red blood cells contain hemoglobin, a red pigment that enables them to carry oxygen. White cells defend the body against infection. Platelets help blood clot (see page 86).

WHAT CAN GO WRONG

- ◆ Oxygen levels in the blood may fall if the hemoglobin (see left) in the red blood cells is reduced (*anemia*), or if there is not enough oxygen in the lungs (see page 62). Anemia makes skin look pale (*pallor*); blood low in oxygen gives a gray-blue tinge to skin (*cyanosis*).
- ◆ Continuously high blood pressure, produced by conditions like hardening of the arteries (*arteriosclerosis*), may cause a blood vessel to burst, resulting in internal bleeding (see page 99).
- ◆ Poor circulation, hardened arteries, or narrowed blood vessels can cause a blood clot (*thrombosis*) to form. A clot may travel within the circulatory system to lodge elsewhere (*embolism*), and can endanger vital organs such as the lungs.
- ◆ A fall in blood pressure (as in severe bleeding) reduces blood supply, and hence oxygen, reaching vital organs (*Shock*, see page 78).

THE PULSE

Each beat of the heart creates a wave of pressure (the pulse) that passes along the arteries. It can normally be felt where an artery passes close to the surface of the body. In adults, the pulse rate is usually between 60 and 100 beats per minute. It is faster in children and may be slower in very fit adults.

The pulse rate may increase with exertion, fear, fever, blood loss, and some illnesses. Certain heart disorders, fainting, and an increase in pressure inside the skull may slow the pulse.

Feeling for a pulse

The pulse can be recorded at the wrist (known as the *radial* pulse) or, in an emergency, at the neck (*carotid* pulse). In babies, the *brachial* pulse, on the inside of the upper arm, may be easier to find.

Use pads of your fingers – not your thumb, which has its own pulse



Taking the radial pulse

Place three fingers in the hollow immediately above the wrist creases at the base of the thumb, and press lightly. Check and record:

- ◆ the rate (beats per minute);
- ◆ the strength (strong or weak);
- ◆ the rhythm (regular or irregular).

SHOCK

The circulatory system distributes blood around the body, so that oxygen and nutrients can pass through and “perfuse” the tissues. When the system fails, circulatory shock will develop. If this is not treated swiftly, vital organs such as the heart and brain may fail, which can lead to death. The condition can be made worse by fear and pain.

Where there is a risk of shock developing, reassuring the victim and making him comfortable may be sufficient to prevent the condition from deteriorating. Do not confuse circulatory shock with *psychogenic shock*. This occurs when, for example, a person suffers deep emotional stress.

What causes circulatory shock?

Shock can develop if the heart fails to pump blood through the circulatory system (a common cause is a heart attack), or if the blood vessels dilate, as in severe infection or anaphylactic shock, reducing the blood pressure.

Shock may also occur if the blood supply to the body's vital organs is reduced through blood loss or loss of other bodily fluids through burns, severe diarrhea, or vomiting. The

body responds to fluid loss initially by diverting the blood supply from the surface to the vital organs. Shock develops if fluid loss is not stopped.

Recognition

At first, the release of epinephrine causes:

- ◆ A rapid pulse.
- ◆ Pale, gray-blue skin, especially inside the lips. A fingernail or earlobe, if pressed, will not regain its color immediately.
- ◆ Sweating and cold, clammy skin.

As shock develops, there may be:

- ◆ Weakness and dizziness.
- ◆ Nausea, and possibly vomiting.
- ◆ Thirst.
- ◆ Rapid, shallow breathing.
- ◆ A weak, “thready” pulse. When the pulse at the wrist disappears, the blood pressure is too low.

As the brain's oxygen supply weakens:

- ◆ The victim may become restless, anxious, and even aggressive.
- ◆ The victim may yawn and gasp for air (known as “air hunger”).
- ◆ The victim will become unconscious.
- ◆ Finally, the heart will stop.

See also:

Severe Burns and Scalds, *page 160.*

Severe External Bleeding, *page 88.*

Unconsciousness, *page 110.*

THE BODY'S REACTION TO BLOOD LOSS

<i>Approximate volume</i>	<i>Effect on the body</i>
1 pint (0.5 liter)	Little or no effect; this is the quantity normally taken in a blood-donor session.
3½ pints (2 liters)	Hormones such as epinephrine are released, quickening the pulse and inducing sweating. Small blood vessels in nonvital areas, such as the skin, shut down to divert blood and the oxygen it carries to the vital organs. Shock becomes evident.
5 pints (3 liters)	As blood or fluid loss approaches this level (half the normal volume of the average adult), the pulse at the wrist may become undetectable. The victim will usually lose consciousness; breathing and the heart may fail.

TREATMENT

YOUR AIMS ARE:

- To recognize shock.
- To treat any obvious cause.
- To improve the blood supply to the brain, heart, and lungs.
- To arrange transport to the hospital.

DO NOT let the victim smoke, eat, drink, or move unnecessarily. If she complains of thirst, moisten her lips with a little water.

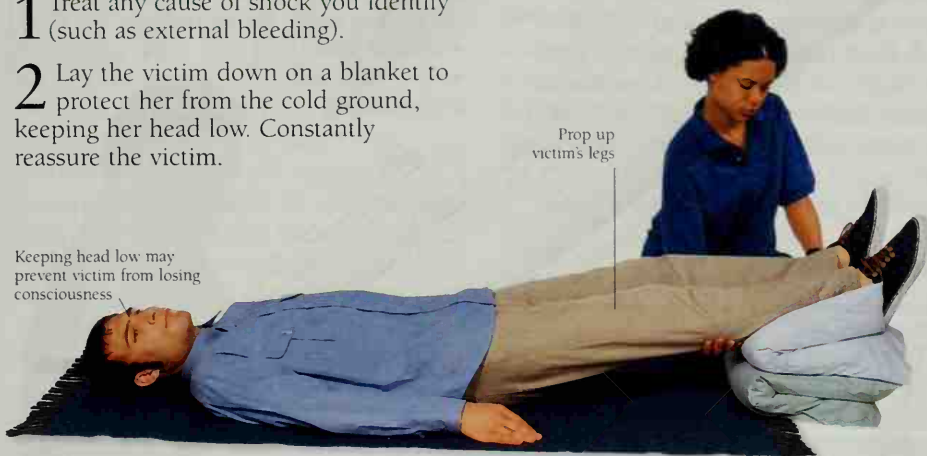
DO NOT leave the victim unattended.

1 Treat any cause of shock you identify (such as external bleeding).

2 Lay the victim down on a blanket to protect her from the cold ground, keeping her head low. Constantly reassure the victim.

Keeping head low may prevent victim from losing consciousness

Prop up victim's legs

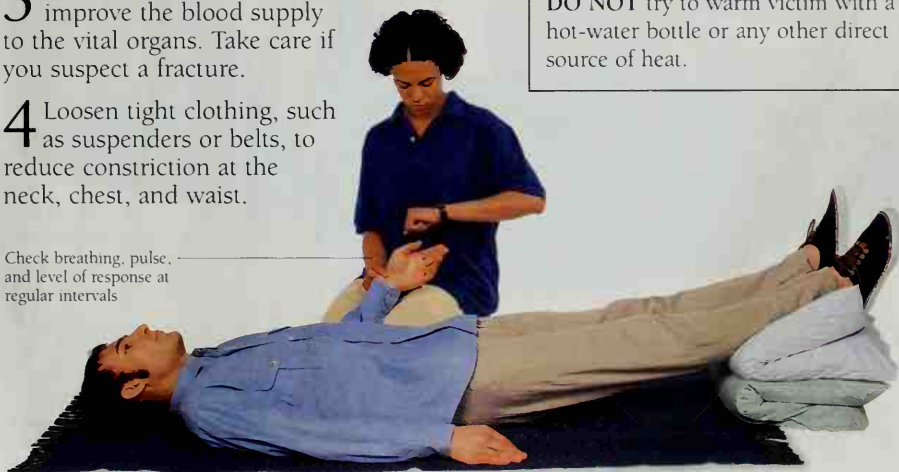


3 Raise and support her legs to improve the blood supply to the vital organs. Take care if you suspect a fracture.

4 Loosen tight clothing, such as suspenders or belts, to reduce constriction at the neck, chest, and waist.

Check breathing, pulse, and level of response at regular intervals

DO NOT try to warm victim with a hot-water bottle or any other direct source of heat.



5 Keep her warm by covering her with coats or blankets.

☎ DIAL 9-1-1 OR CALL EMS.

6 Check and *record* breathing, pulse, and level of response. Be prepared to resuscitate if necessary (see pages 44–58).

FAINTING

A faint (also known as *syncope*) is a brief loss of consciousness that is caused by a temporary reduction of blood flow to the brain. Unlike shock (see page 78), the pulse becomes very slow, although it soon picks up and returns to normal. Recovery from a faint is usually rapid and complete.

A faint may be a reaction to pain or fright, or the result of emotional upset, exhaustion, or lack of food. It is more common, however, after long periods of physical inactivity, such as standing still, especially in a warm

atmosphere. The inactivity causes blood to pool in the lower part of the body, reducing the amount of oxygen available to the brain.

Recognition

- ◆ A brief loss of consciousness causing the person to fall to the floor.
- ◆ A slow pulse.
- ◆ Pale, cold skin and sweating.

See also:
Unconsciousness,
page 110.

TREATMENT

YOUR AIMS ARE:

- To improve blood flow to the brain.
- To reassure the person as she recovers, and make her comfortable.

Watch her face
for signs of
recovery

Raise legs
to improve
blood flow
to brain

Support her
ankles on your
shoulders



- 1 Lay the person down, and raise and support her legs.
- 2 Make sure that she has plenty of fresh air; open a window if necessary.
- 3 As she recovers, reassure her and help her sit up gradually.
- 4 Look for and treat any injury that has been sustained through falling.

IF she does not regain consciousness quickly, open the airway, check breathing and pulse, and be ready to resuscitate if necessary (see pages 44–58). Place her in the recovery position (see page 48).

☎ DIAL 9-1-1 OR CALL EMS.

IF she feels faint again, raise and support her legs until she recovers fully.

ANAPHYLACTIC SHOCK

This is the name given to a major allergic reaction within the body. It is a serious, potentially fatal condition that may develop in susceptible individuals within a few seconds or a few minutes of, for example,

- ◆ the injection of a specific drug;
- ◆ the sting of a certain insect;
- ◆ the ingestion of a particular food, such as peanuts.

In the allergic reaction, chemical substances that are released into the blood dilate blood vessels and constrict air passages. Blood pressure falls dramatically and breathing is impeded. The face and neck can swell, increasing the risk of suffocation. The amount of oxygen reaching the vital organs (heart, brain, and lungs) is

severely reduced. A person with anaphylactic shock urgently needs oxygen and a life-saving injection of epinephrine. First aid is limited to assisting breathing and minimizing shock until specialized help arrives.

Recognition

There may be:

- ◆ Anxiety.
- ◆ Widespread red, blotchy skin eruption.
- ◆ Swelling of the face and neck.
- ◆ Puffiness around the eyes.
- ◆ Impaired breathing, ranging from a tight chest to severe difficulty; the victim may wheeze and gasp for air.
- ◆ A rapid pulse.


See also:

Allergy, page 213.

TREATMENT

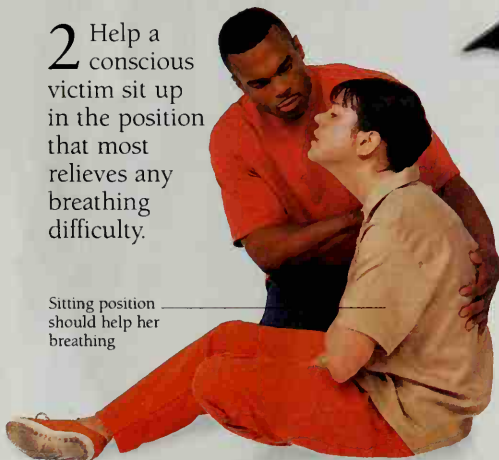
YOUR AIM IS:

- To arrange urgent transport to hospital.

1  **DIAL 9-1-1 OR CALL EMS.**
Give any information you have on the cause of the victim's condition.

2 Help a conscious victim sit up in the position that most relieves any breathing difficulty.

Sitting position should help her breathing



IF she becomes unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Place her in the recovery position (see page 48).

Some people are fully aware of their hypersensitivity, so check for a syringe of epinephrine (Epi-Pen, see page 31). Give the epinephrine yourself if trained, or assist the victim to use the syringe.

DISORDERS OF THE HEART

The heart is a specialized pump. Its muscle, the *myocardium*, "beats" throughout our lives in a smooth, continuous, and coordinated way, controlled by an electrical impulse (see *How the heart beats*, page 43). The heart muscle has its own blood supply, provided by the coronary arteries (so called because they encircle the heart like a crown).

Like all other arteries in the body, the coronary arteries are susceptible to narrowing and blockage, which can impede or even prevent the oxygen from reaching the heart muscle. In severe cases, or if the electrical impulse is disrupted, the heart may stop (*cardiac arrest*).

See also:

Blood flow through the heart, page 76.

ANGINA PECTORIS

The name means a constriction of the chest, and describes the pain that a person experiences when narrowed coronary arteries are unable to deliver sufficient blood to the heart muscle to meet the demands of exertion or, sometimes, of excitement. An attack forces the victim to rest; the pain should then soon ease.

Recognition

There may be:

- ◆ Gripping central chest pain, spreading often to the jaw and down the left arm.
- ◆ Shortness of breath.
- ◆ Weakness, often sudden and extreme.
- ◆ Feeling of anxiety.

TREATMENT

YOUR AIMS ARE:

- To ease strain on the heart by ensuring that the person rests.
- To obtain medical help.

- 1 Help the person sit down. Make her comfortable and reassure her.
- 2 If the person has medicine for angina, such as tablets or an inhaler, let her administer it herself. If necessary, help her take it.
- 3 Encourage the person to rest and keep any bystanders away. The attack should ease within a few minutes.

If the pain persists or returns, suspect a heart attack.

☎ DIAL 9-1-1 OR CALL EMS.

Monitor and *record* her breathing and pulse rate every five minutes, and be ready to resuscitate if necessary (see pages 44–58).

Person with known condition may have inhaler to ease attack



HEART ATTACK

A heart attack most commonly occurs when the blood supply to part of the heart muscle is suddenly obstructed – for example, by a clot in one of the coronary arteries (*coronary thrombosis*). The main risk of a heart attack is that the heart will stop. The effect of the heart attack depends largely on how much of the heart muscle is affected; some victims will recover completely.

Drugs that aid recovery include special medicines called *thrombolytics*, which act to dissolve the clot, and aspirin, which “thins” the blood.

See also:

Cardiac Arrest, page 84.

TREATMENT

YOUR AIMS ARE:

- To minimize the work of the heart.
- To get urgent medical help and arrange transport to the hospital.

1 Make the victim as comfortable as possible to ease the strain on his heart. A half-sitting position, with the victim's head and shoulders well supported and his knees bent, is often best.


Help him into comfortable position



Recognition

There may be:

- ◆ Persistent, vicelike central chest pain, spreading often to the jaw and down the left arm. Unlike *angina pectoris* (see *opposite*), the pain does not ease once the person is at rest, and indeed may occur at rest.
- ◆ Breathlessness and discomfort high in the abdomen, often feeling similar to severe indigestion.
- ◆ Sudden faintness or weakness.
- ◆ A sense of impending doom.
- ◆ “Ashen” skin and blueness at the lips.
- ◆ A rapid, weak, or irregular pulse.
- ◆ Collapse, often without any warning.

2  **DIAL 9-1-1 OR CALL EMS** and say that you suspect a heart attack.

3 Constantly monitor and *record* the victim's breathing and pulse rate, and be prepared to resuscitate if necessary (see pages 44–58).

4 If the victim has medicine for angina, such as tablets or an inhaler, help him take it. If pain persists, and he is fully conscious, give him one tablet of aspirin to *chew or swallow* – unless the person is allergic to aspirin or has asthma.

ACUTE HEART FAILURE

Heart failure is a condition in which the heart muscle is strained and fatigued – for example, following a coronary thrombosis – and becomes increasingly inefficient. Acute attacks often occur at night. They may appear similar to an asthma attack (see page 73), with severe breathlessness, often, but not always, accompanied by other signs and symptoms of heart attack. Follow the treatment for Heart Attack.

CARDIAC ARREST

The term "cardiac arrest" describes any sudden stoppage of the heart. There are many reasons for an arrest, including heart attack (*see page 83*), severe blood loss (*see page 88*), suffocation (*see page 63*), electric shock (*see page 24*), anaphylactic shock (*see page 81*), drug overdose (*see page 122*), and hypothermia (*see page 170*). Cardiac arrest is characterized by the absence of pulse and breathing. You must

commence resuscitation immediately because, without oxygen supplied by the blood, the heart muscle and brain cells will deteriorate rapidly. The ABC of resuscitation is fully described in the chapter on Resuscitation (*pages 44–58*).

Recognition

- ◆ Absence of pulse.
- ◆ Absence of breathing.

TREATMENT

YOUR AIMS ARE:

- To call for immediate professional help.
- To keep the heart muscle and brain supplied with oxygen until help arrives.

Check level of consciousness, breathing and pulse rates, then

☎ DIAL 9-1-1 OR CALL EMS.

IF breathing and pulse are absent, begin CPR (*see pages 52 and 58*).

VENTRICULAR FIBRILLATION

This most common cause of cardiac arrest is an electric storm originating in a chamber of the heart (*ventricle*) that has been damaged or deprived of oxygen. The electric impulse of the heart becomes chaotic, and the heart muscle fails to contract in harmony.

The use of defibrillators

Ventricular fibrillation is often reversed by the early application of a controlled electric shock from a defibrillator machine, which is now carried by most EMS agencies and available in some public places. Your task as the First Aider is to keep the brain supplied with oxygen by cardiopulmonary resuscitation (*see pages 50–58*) until a defibrillator can be brought to the scene.



WOUNDS AND BLEEDING

7

Any abnormal break in the skin or the body surfaces is known as a wound. *Open* wounds allow blood and other fluids to be lost from the body and germs to enter. If the bleeding is purely internal, the wound is *closed*. This is most easily recognized by bruising, which indicates damage to blood vessels just beneath the skin.

The appearance of wounds can be alarming, particularly if there is a lot of bleeding, but prompt action is needed to reduce blood loss and shock.

Understanding treatment procedures

This chapter tells you how the body reacts to blood loss and shows you the effect of various types of wounds and bleeding. The nature of the injury determines the type of wound and influences its treatment. Recommended treatments for all types of wounds – major, internal, and minor – are covered here. It is also important that you take steps to guard against infecting yourself while treating a wound (*see also page 14*).

FIRST-AID PRIORITIES

- ◆ Control blood loss by applying pressure over the wound and raising the injured part.
- ◆ Take steps to minimize shock, which can result from severe blood loss.
- ◆ Cover any open wound with a dressing, to protect it from infection and promote natural healing.
- ◆ Pay attention to hygiene, so that there is no spread of infection between the injured person and yourself.

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BLOOD CLOTTING

Blood is carried around the body by vessels known as arteries, veins, and capillaries (see page 76). When a blood vessel is torn or cut, the vessel contracts at the injury site to attempt to stop bleeding. Blood loss and shock (see page 78) may make blood pressure fall.

Injured tissue cells at the site of a wound and specialized blood cells (*platelets*) trigger a series of reactions to produce the chemical *thrombin*. This reacts with a blood protein (*fibrinogen*) to create *fibrin* filaments that mesh together to form a clot.

The clot releases a pale fluid (*serum*) containing antibodies and specialized cells that begin the process of repair. Later, the clot dries into a crust (*scab*) that seals and protects the wound until the healing process is complete.

WHAT CAN GO WRONG

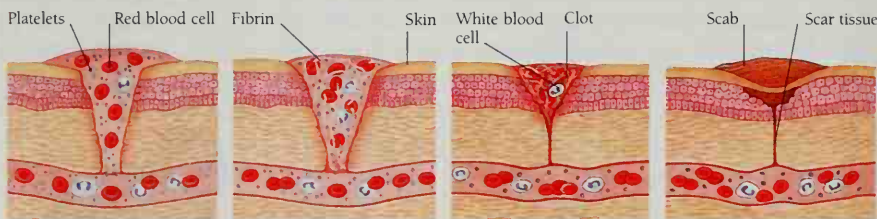
In some medical conditions, "blood thinners" are used to stop clots forming in blood vessels. Other conditions such as *hemophilia* (which usually affects only males), *purpura*, and *leukemia* may prevent normal blood-clotting; they can cause internal bleeding under the skin or into joints or from the linings of internal organs.

Components of blood

- Red cells
- White cells
- Platelets
- Plasma - dissolved proteins, such as fibrinogen
 - salts, sugars, fats
 - minerals, vitamins
 - water

☐ Agents active in the clotting of blood

HOW BLOOD CLOTS AT A WOUND



1 Blood *platelets* come into contact with the damaged vessel wall, become sticky, and clump at the injury site.

2 The platelets and damaged cells react with a blood protein to create a mesh of *fibrin* filaments.

3 The fibrin mesh traps more blood cells at the injury site to form a jellylike clot within ten minutes.

4 The fibrin contracts and the clot rapidly shrinks, releasing *serum* that causes the area to swell, and leaves a scar.

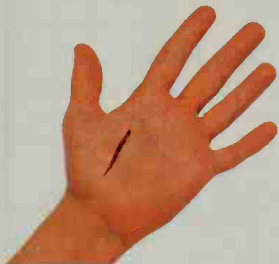
BLOOD TRANSFUSIONS

If a person loses 2 pints (one liter) or more of blood, he or she may need to be given a blood transfusion. Before this is done, a person's blood group must be determined. All red blood cells contain chemicals known as *antigens*. A person's blood is classified according to whether it contains antigen A, B, both (AB), or neither (O). The Rhesus factor may also

be present in (*Rh positive*), or absent from (*Rh negative*), the blood. A body only accepts blood with similar antigens.

Therefore, all patients' and donors' blood is cross-matched to ensure its compatibility before a transfusion. It is crucial that you get a victim to the hospital as soon as possible to allow time for accurate cross-matching.

TYPES OF WOUNDS



Simple laceration

A clean cut from a sharp edge, such as broken glass, causes a simple laceration. The blood vessels at the wound edges are cut straight across, so there may be profuse bleeding. Limb wounds may sever underlying structures such as tendons.



Complex laceration

Crushing or ripping forces result in rough tears or complex lacerations. They may bleed less profusely than clean-cut wounds, but there is likely to be more tissue damage and bruising. They are also often contaminated; the risk of infection is high.



Abrasion (graze)

This is a superficial wound in which the top layers of skin are scraped off, leaving a raw, tender area. Abrasions are often caused by a sliding fall or a friction burn. They can contain embedded foreign particles that may result in infection.



Contusion (bruise)

A blunt blow or punch can rupture capillaries beneath the skin. Blood then leaks into the tissues, causing bruising. The skin occasionally splits. Severe bruising may indicate deeper, hidden damage, such as fracture or internal injury.



Puncture wound

Standing on a nail or being stabbed will result in puncture wounds. These have a small entry site, but a deep track of internal damage. Since dirt and germs can be carried deep into the body, the infection risk is high.



Gunshot wound

A bullet or other missile may drive into or through the body, causing serious internal injury and contamination. The entry wound may be small and neat; any exit wound may be large and ragged.

TYPES OF BLEEDING

Bleeding (also known as *hemorrhage*) is classified by the type of blood vessel that is damaged: artery, vein, or capillary

(see page 76). Arterial bleeding can be very dramatic, but copious venous bleeding is potentially more serious.

Arterial bleeding

Richly oxygenated blood is bright red and, under pressure from the heart, spurts from a wound in time with the heartbeat. A severed main artery may jet blood several feet high, and rapidly reduce the volume of circulating blood.

Venous bleeding

Venous blood, having given up its oxygen, is dark red. It is under less pressure than arterial blood, but since vein walls are capable of great distension, blood can "pool" within them. Blood from a severed major vein may gush profusely.

Capillary bleeding

This type of bleeding, or oozing, occurs at the site of all wounds. Capillary bleeding may at first be brisk, but blood loss is usually small. A blunt blow may rupture capillaries under the skin, causing bleeding into the tissues (bruise).

SEVERE EXTERNAL BLEEDING

Massive external bleeding is dramatic and frightening, and may distract you from first-aid priorities; remember the ABC of resuscitation (*see page 44*). Bleeding at the face or neck can block the airway. Rarely is blood loss so great that the heart stops. Bear in mind that shock is likely to develop; the victim may lose consciousness.

See also:

Shock, *page 78*.

Unconsciousness, *page 110*.

PROTECTING YOURSELF

If possible, use disposable gloves and wash your hands well in soap and water before and after treatment. If you have any sores or open wounds, you should cover them with a waterproof adhesive dressing (*see also page 14*).



TREATMENT

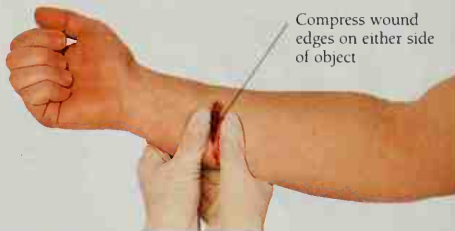
YOUR AIMS ARE:

- To control the bleeding.
- To prevent and minimize the effects of shock.
- To minimize the risk of infection.
- To arrange urgent transport to the hospital.

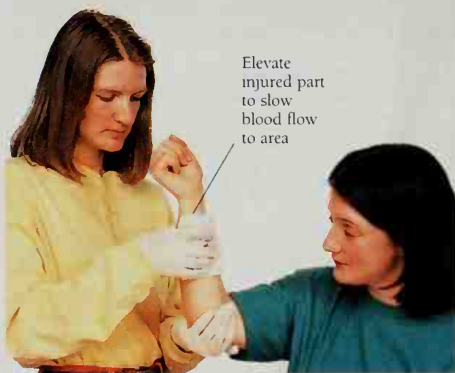
1 Remove or cut clothing to expose the wound. Watch out for sharp objects, such as glass, that may injure you.



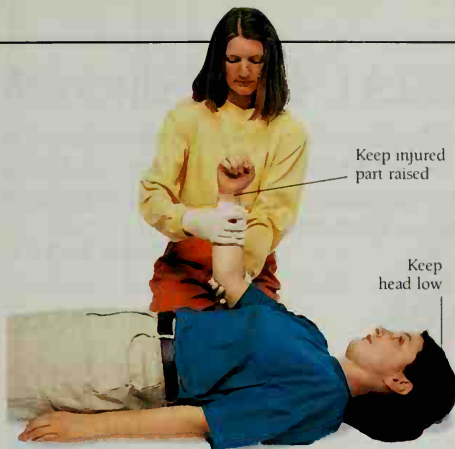
2 Apply direct pressure over the wound with your fingers or palm, preferably over a sterile dressing or clean pad – but do not waste time hunting for a dressing.



If you cannot apply direct pressure, for example, if an object is protruding, press down firmly on either side of the wound.



3 Raise and support an injured limb above the level of the heart. Handle the limb very gently; the injury may involve a fracture (*see page 130*).



4 Lay the victim down. This will reduce blood flow to the site of injury, and minimize shock.

5 Leaving any original pad in place, apply a sterile dressing. Bandage it in place firmly, but not so tightly as to cut off the circulation (see page 223). If bleeding seeps through the dressing, bandage another firmly over the top.



IF there is a protruding foreign body, build up padding on both sides of the object to stabilize it from movement.

6 Secure and support the injured part with bandaging.

7 **☎ DIAL 9-1-1 OR CALL EMS.** Treat for shock. Check the dressing for seepage. Check the circulation beyond the bandage (see page 223).

INDIRECT PRESSURE

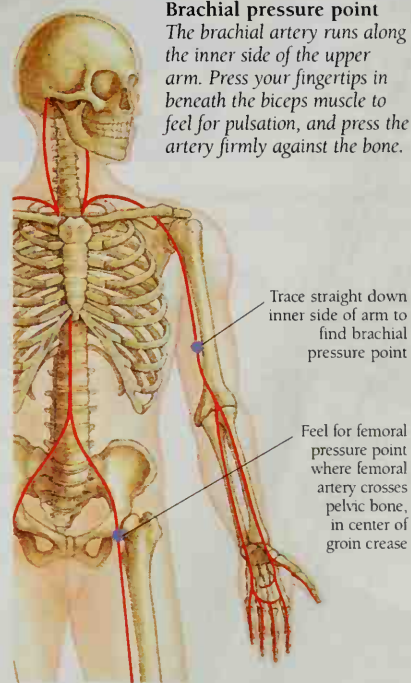
Direct pressure at the bleeding point can be impossible to apply, or may be insufficient to stop bleeding from a limb. In these cases, "indirect pressure" may be applied to a pressure point above the bleeding artery, where the main artery runs close to a bone.

First identify the artery by feeling for pulsation (see below) and then apply pressure until the blood supply to the wound is greatly reduced. This pressure must not be applied for longer than ten minutes, except for a femoral artery.

DO NOT apply a tourniquet; it can worsen the bleeding and may result in tissue damage or even gangrene.

Brachial pressure point

The brachial artery runs along the inner side of the upper arm. Press your fingertips in beneath the biceps muscle to feel for pulsation, and press the artery firmly against the bone.



Femoral pressure point

Lay the victim down with the knee bent to locate the groin or trouser fold, feel for the artery, then press firmly with your thumbs.

BLEEDING AT SPECIAL SITES

There are a number of wounds that require slight variations to the general rules of direct and indirect pressure if they are to be successfully treated.

Blood loss from wounds at these special sites may be copious, and the victim must be observed carefully for signs of shock.

SCALP AND HEAD WOUNDS

The scalp has a rich blood supply, and when it is damaged, the skin splits, producing a gaping wound. Bleeding may be profuse and will often make the injury appear worse than it is. However, a scalp wound may be part of a more serious underlying injury, such as a skull fracture; examine the victim very

carefully, particularly if he or she is elderly, or when it is possible that a serious head injury is masked by alcohol or drug intoxication. If in doubt, follow the treatment for head injury.

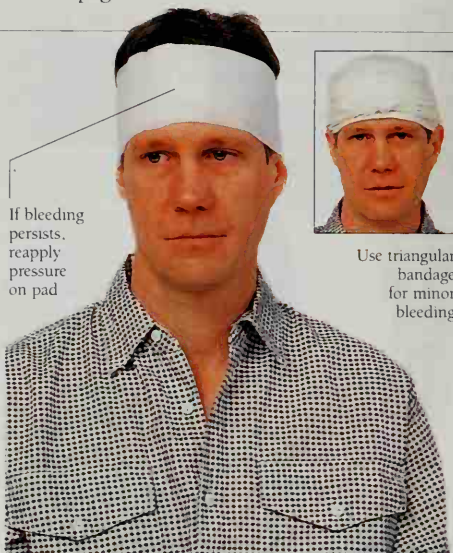
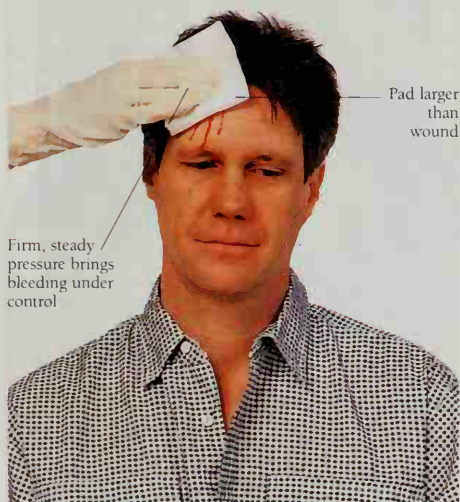
See also:
Head Injuries, page 113.
Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To control blood loss.
- To arrange transport to the hospital.

1 Wearing disposable gloves, if possible, replace any displaced skin flaps.



3 Secure the dressing with a roller bandage. Lay the victim down with head and shoulders slightly raised.

IF he becomes unconscious, open the airway, check breathing and pulse, and be ready to resuscitate if needed (*see pages 44-58*). Place in the recovery position.

2 Apply firm direct pressure over a sterile dressing or clean pad.

4 Arrange to take or send the victim to the hospital.

WOUNDS TO THE PALM

The palm is richly supplied with blood, and a wound may bleed profusely. A deep wound may cut tendons and

nerves, and result in loss of feeling in the fingers. If a foreign body prevents fist-clenching, treat as described on page 105.

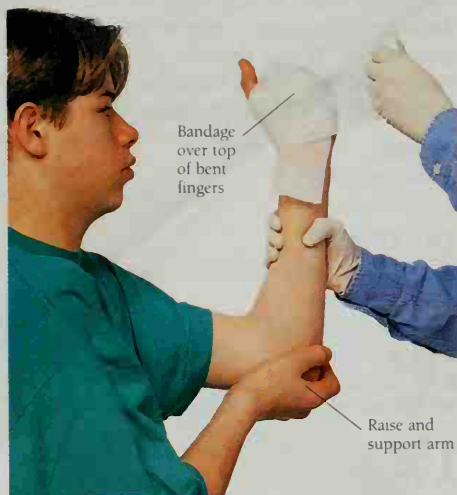
TREATMENT

YOUR AIMS ARE:

- To control blood loss.
- To arrange transport to the hospital.



1 Press a sterile dressing or clean pad firmly into the palm and ask the victim to clench his fist over it. If he finds it difficult to press hard, he may grasp the fist with his uninjured hand.



2 Bandage the fingers so that they are clenched over the pad. Tie the knot over his fingers.

3 Support the arm in an elevation sling (see page 233) and arrange to take or send the victim to the hospital.

WOUNDS AT JOINT CREASES

Major blood vessels cross the inside of the elbow and knee and, if cut, will bleed heavily. Remember that the technique

described below will, by compressing the artery, reduce the blood supply to the lower part of the limb.

TREATMENT

YOUR AIMS ARE:

- To control blood loss.
- To arrange transport to the hospital.

1 Press a clean pad over the injury. Bend the joint as firmly as possible.

2 With the joint firmly bent to press on the pad, raise the limb. If possible, lay the victim down to reduce shock.

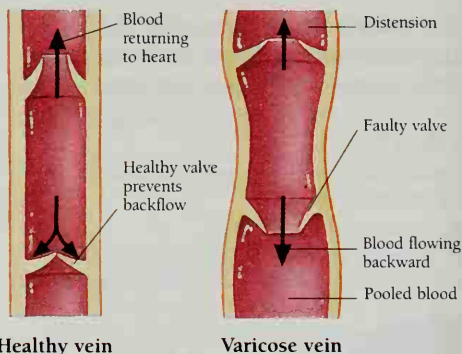
3 Take or send the victim to the hospital. Make sure that you release the pressure briefly every ten minutes to restore normal blood flow to the extremity.

BLEEDING VARICOSE VEINS

Veins contain one-way valves that keep the blood flowing toward the heart. If these deteriorate, blood collects behind them and causes distension, most often in the legs. The "varicose" vein has thin, distended walls and is often raised, stretching the skin to give a "knobby" appearance. It can rupture after minor injury and will bleed profusely. Shock may develop if bleeding is not controlled.

See also:

Shock, page 78



TREATMENT

YOUR AIMS ARE:

- To bring blood loss under control.
- To arrange transport to the hospital.
- To minimize shock.

1 Lay the victim on her back and raise the injured leg as high as possible. This may reduce or stop the bleeding.

2 Expose the site of the bleeding and apply firm, direct pressure over a sterile dressing or clean pad with a securing bandage or with your fingers, until bleeding is controlled.



4 Put a large, soft pad over the dressing; bandage it firmly enough to exert even pressure (see page 223).

3 Remove garments such as constricting stockings that may be blocking venous blood flow back to the heart.

5 Arrange for transport and keep the victim comfortable. Take or send the victim to the hospital.

MAJOR WOUNDS

Many wounds can cause serious internal injury without severe external bleeding. This applies particularly to wounds to the trunk; a stab wound to

the abdomen, for example, may produce only a small entry wound, yet cause massive internal damage that needs emergency treatment.

ABDOMINAL WOUNDS

The severity of an abdominal wound may be evident by external bleeding and protruding abdominal contents. More often, there is hidden internal injury and bleeding. A stab wound, gunshot, or crushing injury to the abdomen may puncture,

lacerate, or rupture internal organs and blood vessels deep in the body. The risk of infection and shock is high.

See also:

Internal Bleeding, page 99.

Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To minimize the risk of infection.
- To minimize shock.
- To arrange transport to the hospital.

1 Lay the victim down on a firm surface. Loosen any tight clothing.



If wound cuts across abdomen, raise and support victim's knees to ease strain on injury

IF the wound is vertical, do not raise the knees.

2 Put a large dressing over the wound, and secure it lightly in place with a bandage or some adhesive tape.



IF blood seeps through the dressing, add another dressing or pad on top.

IF the victim coughs or vomits, press firmly on the dressing to prevent the contents of the abdomen from pushing through the wound and being exposed.

IF part of the intestine is protruding, do not touch it, but cover with a plastic bag, plastic kitchen wrap, or a sterile dressing to prevent it from drying out.

3 **DIAL 9-1-1 OR CALL EMS.**

Treat the victim for shock. Stay and check his condition every few minutes until help arrives.

IF the victim becomes unconscious, open the airway, check breathing and pulse, and be ready to resuscitate if needed (see pages 44–58). Put him in the recovery position, supporting the abdomen.

PENETRATING CHEST WOUNDS

The heart and lungs, and the major blood vessels around them, lie within the chest (*thorax*), protected by the breastbone and the 12 pairs of ribs (see page 124). The ribs extend far enough downward to protect the upper abdominal organs.

A penetrating chest wound can cause severe internal damage within both the chest and upper abdomen. The lungs are particularly vulnerable to injury, either directly, or because the wound punctures the membranes (*pleura*) that protect each lung. Air can then enter the chest, exerting pressure on the lung that can cause it to collapse, a condition known as *pneumothorax*.

Sometimes air pressure builds up to such an extent that it affects the uninjured lung as well. Such damage causes the development of increasing shortness of breath. The pressure may also reduce

blood return to the heart, impairing the circulation and causing shock; this is a *tension pneumothorax*.

Recognition

- ◆ Difficult and painful breathing, possibly rapid, shallow, and uneven.
- ◆ An acute sense of alarm.

There may also be:

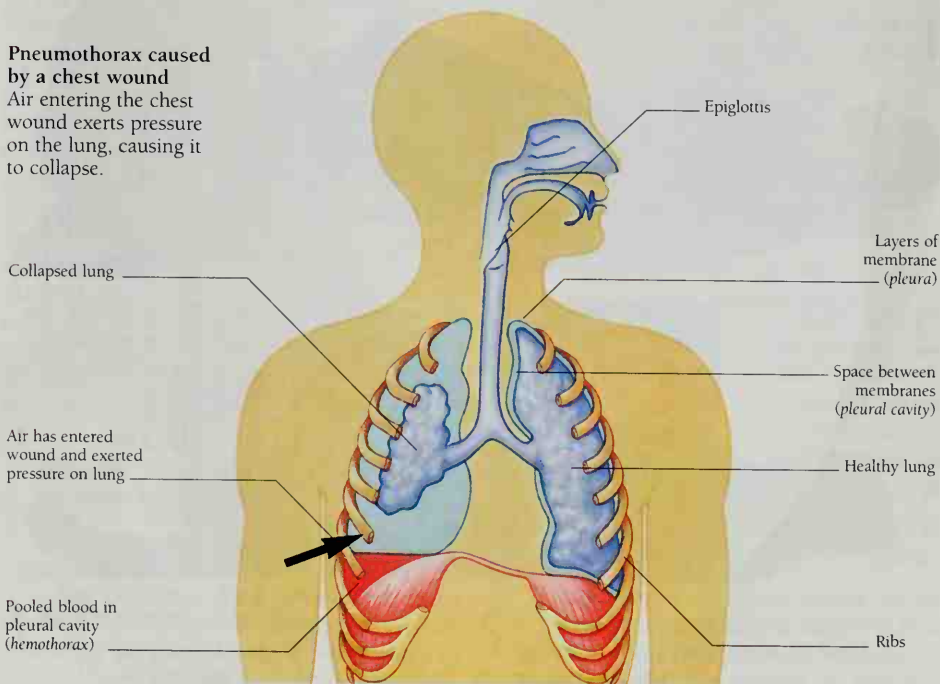
- ◆ Signs of shock.
- ◆ Coughed-up frothy, red blood.
- ◆ Gray-blue coloring (*cyanosis*) at the mouth, nailbeds, and skin.
- ◆ A crackling feeling of the skin around the site of the wound, caused by air collecting in the tissues.
- ◆ Blood bubbling out of the wound.
- ◆ The sound of air being sucked into the chest as the victim breathes in.

See also:

Shock, page 78.

Pneumothorax caused by a chest wound

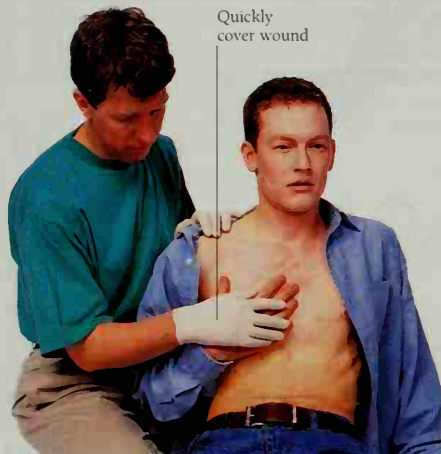
Air entering the chest wound exerts pressure on the lung, causing it to collapse.



TREATMENT

YOUR AIMS ARE:

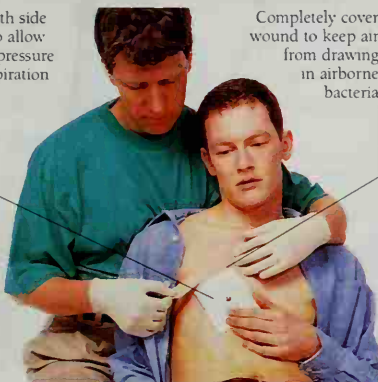
- To seal the wound and maintain breathing.
- To minimize shock.
- To arrange transport to the hospital.



Quickly
cover wound

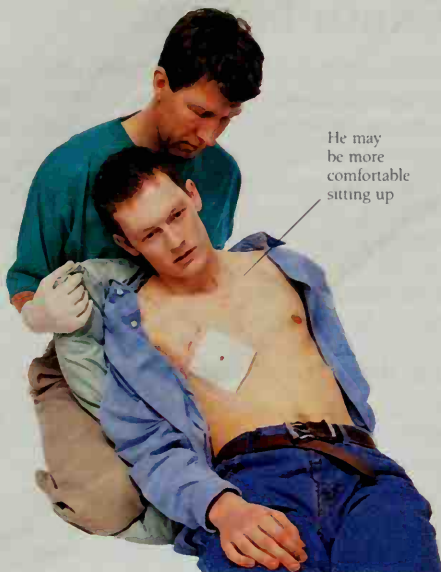
1 Immediately use the palm of your hand or, if the victim is conscious, his own hand, to cover the wound.

Leave fourth side untaped to allow air under pressure during expiration to escape



Completely cover wound to keep air from drawing in airborne bacteria

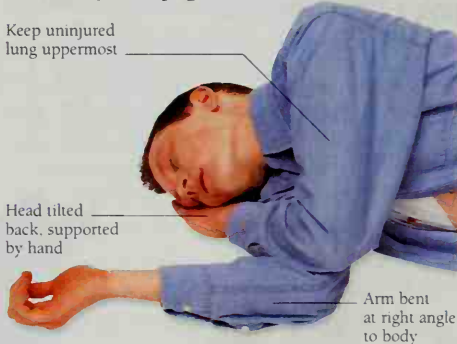
2 Place a sterile dressing or clean pad over the wound and surrounding area. Cover with a plastic bag, foil, or plastic kitchen wrap. Secure firmly with adhesive tape on three sides, or with bandaging, so that the dressing is taut.



He may be more comfortable sitting up

3 Provide firm support for a conscious victim, in the position he finds most comfortable. Encourage him to lean toward the injured side.

4 ☎ **DIAL 9-1-1 OR CALL EMS.** Treat the victim for shock if necessary (see page 78).



Keep uninjured lung uppermost

Head tilted back, supported by hand

Arm bent at right angle to body

IF he becomes unconscious, open the airway, check breathing and pulse, and be ready to resuscitate if necessary (see pages 44–58). Place him in the recovery position (see page 48), lying with the uninjured side uppermost. This will help the healthy lung to work effectively.

CRUSH INJURIES

These are commonly caused by traffic collisions, construction site and industrial injuries, explosions, and natural disasters such as hurricanes and earthquakes.

Local injuries may include fractures, swelling, blistering, and internal bleeding. The crushing force may also impair the circulation, causing numbness at or below the site of injury; there may be no detectable pulse in a crushed limb.

The dangers of prolonged crushing

If the victim is trapped for any length of time, extensive tissue damage may occur, especially to muscles. Once the pressure

is removed, shock may develop rapidly as tissue fluid leaks into the injured area.

Extensive and prolonged crush injury results in a buildup of toxic substances which can cause kidney failure. This process, called "crush syndrome," is extremely serious and can be fatal.

See also:

Fractures, pages 130–31.

Internal Bleeding, page 99.

Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To obtain specialized medical aid urgently, meanwhile taking any steps possible to treat the victim.
- To determine the length of time the victim has been crushed and to start treatment.

FOR A CRUSH VICTIM

- 1 **DIAL 9-1-1 OR CALL EMS.**
Give clear details of the incident.
- 2 Release the victim, if possible.
- 3 Control any external bleeding and cover any wounds.
- 4 Secure and support any suspected fractures.
- 5 Examine and observe the victim for signs of internal bleeding and shock, and treat accordingly.

DO NOT worsen an injury by shifting a heavy object. Wait for help if you are unable to safely free the victim.



- 6 Comfort and reassure the victim until help arrives.

IMPALEMENT

If someone becomes impaled by, for example, falling on railings, you must never attempt to lift him or her off; you

may worsen internal injuries. Give clear details to the emergency services; they will bring specialized cutting equipment.

TREATMENT

YOUR AIM IS:

- To prevent further injury.

1 DIAL 9-1-1 OR CALL EMS.

Explain the situation clearly. If possible, get a helper to call.

2 Support the victim's weight so that he or she is as comfortable as possible. Constantly reassure the victim.

3 **DO NOT** remove any impaled objects from the victim.

DO NOT give the victim anything to eat or drink.

AMPUTATION

Injuries may result in partial or complete amputation of a limb. It is sometimes possible, using microsurgical techniques, to reattach an amputated part, so it is important to locate and preserve it. The sooner the victim and the severed part reach the hospital the better. It is

important to describe the injury clearly to the emergency services, because they will then be able to alert the appropriate specialist center.

See also:
Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To minimize blood loss and shock.
- To preserve the amputated part.

CARE OF THE INJURED

1 Control blood loss by applying direct pressure, and raising the injured part, or apply indirect pressure (see page 89).

DO NOT use a tourniquet.

2 Apply a sterile dressing or nonfluffy clean pad secured with a bandage.

3 Treat the victim for shock (see page 78).

4 DIAL 9-1-1 OR CALL EMS.

State that amputation is involved.

CARE OF THE AMPUTATED PART

1 Wrap the severed part in plastic kitchen wrap or a plastic bag.

2 Wrap again in gauze or soft fabric, then place the package in another container (for example, another plastic bag) filled with crushed ice. Chilling will help to preserve the part.

3 Clearly mark the package with the time of injury and the victim's name. Give it personally to medical personnel.

DO NOT use cotton padding on surfaces of raw or open wounds.

DO NOT wash the severed part.

DO NOT allow the severed part to come into direct contact with ice.

EYE WOUNDS

The eye (*see page 178*) can be bruised or cut by direct blows or by sharp, chipped fragments of metal, stone, or glass. All eye injuries are potentially serious. Even superficial abrasions on the eye's surface (*cornea*) can lead to scarring or infection, with possible impairment of vision.

A penetrating wound may rupture the eyeball and allow its clear fluid content to escape. This type of injury is very serious. Although it is possible to repair eye wounds, and sight in the eye may or may not be lost.

TREATMENT

YOUR AIMS ARE:

- To prevent further damage.
- To arrange transport to the hospital.

1 Lay the victim on her back, holding her head to keep it as still as possible.

DO NOT touch or attempt to remove an embedded foreign body (*see page 105*).

2 Tell the victim to keep both eyes still; movement of the "good" eye will cause movement of the injured one, which may damage it further.

Support victim's shoulders on your knees

Cradle head to keep it still

Recognition

◆ Intense pain in the affected eye, with spasm of the eyelids.

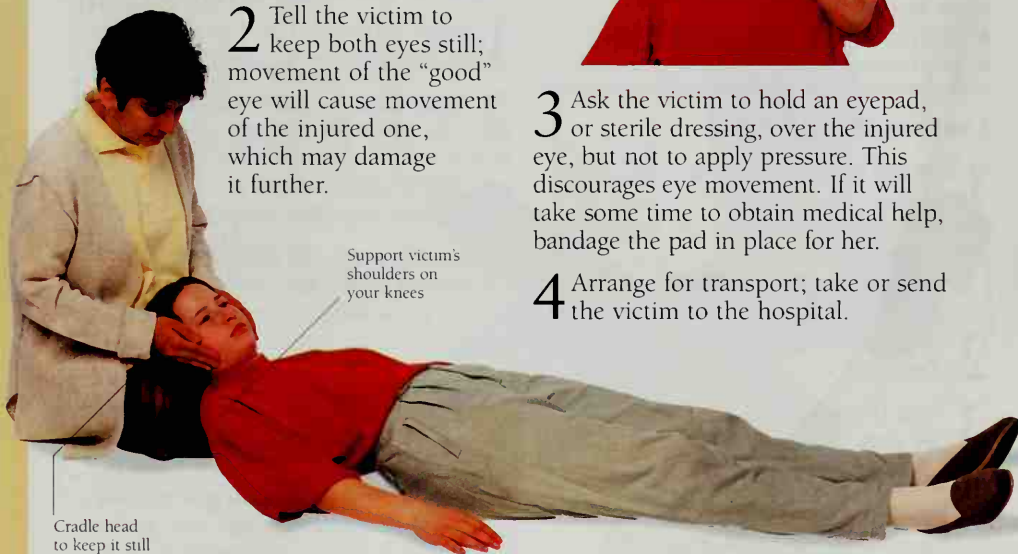
There may also be:

- ◆ A visible wound.
- ◆ A bloodshot appearance to the injured eye, even if there is no visible wound.
- ◆ Partial or total loss of vision.
- ◆ Leakage of blood or clear fluid from a wound, possibly with visible flattening of the eyeball.



3 Ask the victim to hold an eyepad, or sterile dressing, over the injured eye, but not to apply pressure. This discourages eye movement. If it will take some time to obtain medical help, bandage the pad in place for her.

4 Arrange for transport; take or send the victim to the hospital.



INTERNAL BLEEDING

Bleeding within the body cavities may follow injury, such as a fracture or penetrating wound, but can also occur spontaneously – for example, bleeding from a stomach ulcer.

Internal bleeding is serious; even if blood does not leave the body, it is still lost from the circulation, and shock can develop. Accumulated blood can also exert damaging pressure on organs such as the lungs or brain.

When to suspect internal bleeding

Suspect internal bleeding if, following injury, signs of shock develop without obvious blood loss. At the site of a violent injury, there may be “pattern bruising” – discoloration with the pattern of clothes or crushing objects. There may be blood at body orifices, either fresh or mixed with the contents of injured organs.

Recognition

There may be:

- ◆ Pallor.
- ◆ Cold, clammy skin.
- ◆ A rapid, weak pulse.
- ◆ Pain.
- ◆ Thirst.
- ◆ Confusion, restlessness, and irritability, possibly leading to collapse and unconsciousness.
- ◆ After violent injury, pattern bruising.
- ◆ Bleeding from orifices (*see next page*).
- ◆ Information from that indicates recent injury or illness, previous similar episodes, or if he or she takes drugs for a medical condition.

See also:

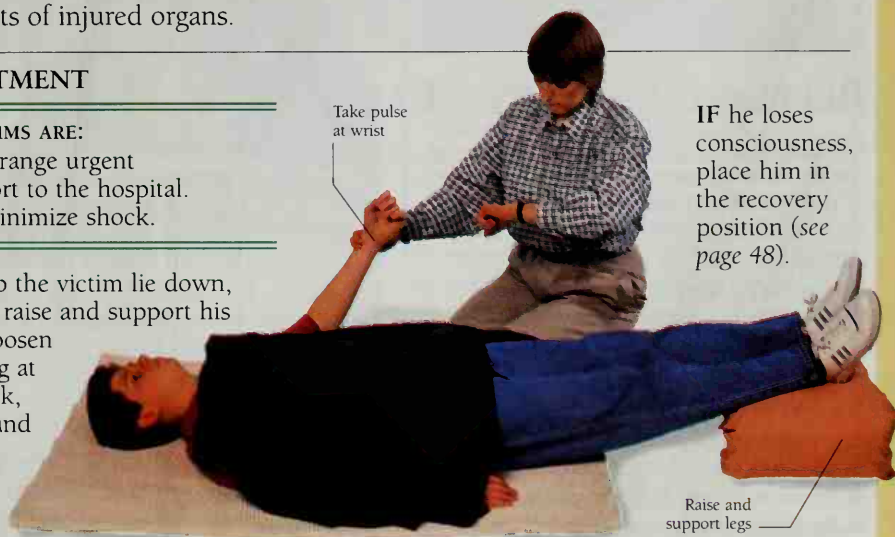
- Cerebral Compression, *page 115*.
- Crush Injuries, *page 96*.
- Shock, *page 78*.
- Unconsciousness, *page 110*.

TREATMENT

YOUR AIMS ARE:

- To arrange urgent transport to the hospital.
- To minimize shock.

1 Help the victim lie down, and raise and support his legs. Loosen clothing at the neck, chest, and waist.



IF he loses consciousness, place him in the recovery position (*see page 48*).

2 **DIAL 9-1-1 OR CALL EMS.** Keep the victim warm. Monitor and record breathing, pulse, and level of response every ten minutes.

3 Note the type, amount, and source of any blood loss from body orifices (*see page 100*).

BLEEDING FROM ORIFICES

<i>Site</i>	<i>Appearance</i>	<i>Cause</i>
Mouth	Bright red, frothy, coughed-up blood (<i>hemoptysis</i>).	Bleeding in the lungs.
	Vomited blood (<i>hematemesis</i>), red or dark reddish brown, resembling coffee grounds.	Bleeding within the digestive system.
Ear	Fresh, bright-red blood.	Injury to the inner or outer ear; perforated eardrum.
	Thin, watery blood.	Leakage of cerebrospinal fluid following head injury.
Nose	Fresh, bright-red blood.	Ruptured blood vessel in the nostril.
	Thin, watery blood.	Leakage of cerebrospinal fluid following head injury.
Anus	Fresh, bright-red blood.	Injury to the anus or lower bowel.
	Black, tarry, offensive-smelling stool (<i>melena</i>).	Injury to the upper bowel.
Urethra	Urine with a red or smoky appearance (<i>hematuria</i>) and occasionally clots.	Bleeding from the bladder or kidneys.
Vagina	Either fresh or dark blood.	Menstruation; miscarriage; disease of, or injury to, the vagina or uterus.

BLEEDING FROM THE EAR

Bleeding that originates from inside the ear may follow a rupture (*perforation*) of the eardrum. Causes include a foreign body pushed into the ear, a blow to the side of the head, or an explosion. The victim may experience a sharp pain as the eardrum ruptures, followed by earache and partial deafness.

If bleeding follows a head injury, the blood may appear thin and watery. This is very serious, because it indicates that the skull is fractured and cerebrospinal fluid is leaking from around the brain.

See also:

Foreign Bodies in the Ear, *page 181*.

Head Injuries, *page 113*.

TREATMENT

YOUR AIMS ARE:

- To allow blood to drain away.
- To minimize the risk of infection.
- To arrange transport to the hospital.

DO NOT plug the ear.

- 1** Help the victim into a half-sitting position, with the head inclined to the injured side down to let the blood drain.
- 2** Cover the ear with a sterile dressing or clean pad, lightly held in place.
- 3** Send or take the victim to the hospital in the treatment position.

BLEEDING FROM THE MOUTH

Cuts to the tongue, lips, or lining of the mouth range from trivial injuries to more serious wounds. The cause is usually the person's own teeth or dental extraction.

Bleeding from the mouth may be profuse and can be alarming. Profuse bleeding can be dangerous if inhaled; if the blood is swallowed, it can cause vomiting.

TREATMENT

YOUR AIMS ARE:

- To control bleeding.
- To safeguard the airway by preventing any inhalation of blood.

1 Sit the injured person down, with her head forward and inclined towards the injured side, to allow blood to drain.



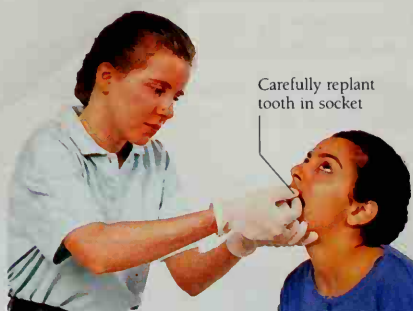
2 Place a gauze dressing pad over the wound. Ask the person to squeeze the wound and the pad between finger and thumb, and press for ten minutes.

IF a tooth socket is bleeding, take a gauze pad that is thick enough to stop the teeth from meeting, place it across the socket, and tell her to bite on it.



KNOCKED-OUT TOOTH

An adult tooth should be replanted in its socket as soon as possible after being knocked out. If it is lost, ask someone to look for it while you administer first aid. Do not replace a child's primary tooth.



Care of the tooth

Do not clean the tooth, since you may damage the tissues. Replace the tooth in its socket, keeping it in position by pressing a pad between the bottom and top teeth. If you cannot replant the tooth, keep it moist in water or milk, or in the injured person's mouth. Send her to a dentist or hospital.

3 If bleeding persists, replace the pad with a fresh one. Tell the person to let any escaping blood dribble; if swallowed, it may induce vomiting.

DO NOT wash the mouth out, as this may disturb a clot.

4 Advise the person to avoid hot drinks for 12 hours.

IF the wound is large, or if bleeding persists beyond 30 minutes, or recurs, seek medical or dental advice.

NOSEBLEEDS

These most commonly occur when blood vessels inside the nostrils are ruptured, either by a blow to the nose, or as a result of sneezing, picking, or blowing the nose. Infection, such as a cold or flu, makes the blood vessels in the nose more fragile; nosebleeds may also occur as a result of high blood pressure. Nosebleeds are usually just unpleasant, but they can

be dangerous if the injured person loses a lot of blood. Where a nosebleed follows a head injury, the blood may appear thin and watery. This is very serious, as it is a sign that cerebrospinal fluid (see page 108) is leaking from around the brain.

See also:
Head Injuries, page 113.

TREATMENT

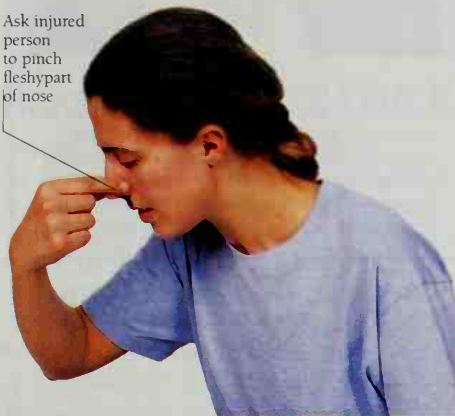
YOUR AIMS ARE:

- To control blood loss.
- To maintain an open airway.

1 Sit the injured person down with her head held well forward.

DO NOT let her head tip back; blood may run down her throat and induce vomiting.

Ask injured person to pinch fleshy part of nose



2 Ask the person to breathe through her mouth (this will also have a calming effect), and to pinch her nose just below the bridge. Help her if necessary.

3 Tell her to try not to speak, swallow, cough, spit, or sniff, since she may disturb blood clots. Give her a clean cloth or tissue to mop up spit.



IF the injured person is a young child, let her drool or spit into a bowl.

4 After ten minutes, tell the person to release the pressure. If her nose is still bleeding, reapply the pressure for further periods of ten minutes.

IF the nosebleed persists beyond 30 minutes, take or send the person to the hospital in the treatment position.

5 Once the bleeding is under control, and with the person still leaning forward, gently clean around her nose and mouth with lukewarm water.

6 Advise the person to rest quietly for a few hours, and to avoid exertion and, in particular, not to blow her nose, since this will disturb any clot.

VAGINAL BLEEDING

Bleeding from the vagina is most likely to be menstrual bleeding, often with abdominal cramps, but it can also indicate miscarriage, recent abortion, internal disease or infection, or injury as a result of sexual assault. The history of the condition is vital to diagnosis, and has some bearing on the first aid given. If the bleeding is severe, shock may develop.

Always be sensitive to the woman's feelings. She may be embarrassed or may resent a male presence. Male First Aiders should, if possible, seek the help of a female chaperone.

See also:
Miscarriage, page 202.
Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To make the woman comfortable and to reassure her.
- To observe and treat for shock.
- To arrange transport to the hospital, if necessary.

1 Remove the woman, if possible, to a place with some privacy, or arrange for screening to be set up.

2 Find a sanitary pad or a clean towel and give it to her.



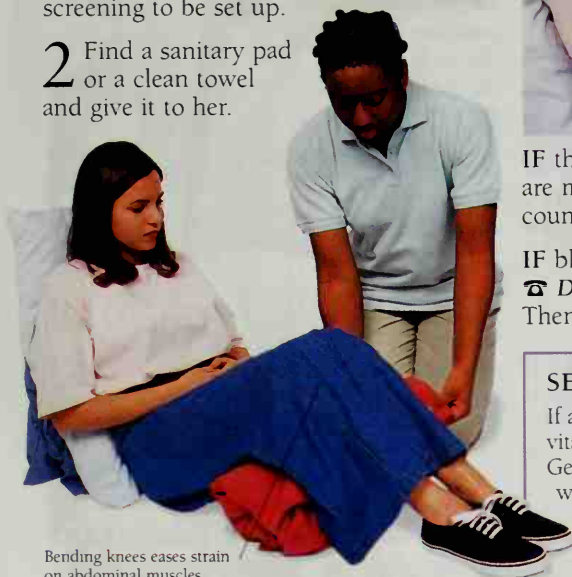
Help her take her own medication

IF the woman knows that her cramps are menstrual, she may take an over-the-counter or prescription pain-killing drug.

IF bleeding continues or is severe,
☎ **DIAL 9-1-1 OR CALL EMS.**
Then treat for shock (see page 78).

SEXUAL ASSAULT

If a woman has been assaulted, it is vital to preserve the evidence if possible. Gently encourage her to refrain from washing or using the toilet until a forensic examination has been performed by a doctor, but do not insist. If she wishes to remove her clothing, keep it intact in a clean plastic bag if possible. A woman who has been recently assaulted may feel threatened by a male "rescuer."



Bending knees eases strain on abdominal muscles

3 Make the woman as comfortable as possible, in whichever position she prefers. If she chooses to sit up, prop her up with rolled-up clothing or cushions.

MINOR WOUNDS

Prompt first aid can help nature heal small wounds and prevent infection. But you must seek medical advice:

- ◆ if there is a foreign body embedded in the wound (*see opposite page*);
- ◆ if the wound is at special risk of infection (such as a dog bite, or a puncture by a dirty object);
- ◆ if an old wound shows signs of becoming infected (*see page 106*).

GOOD WOUND CARE

- ◆ First wash your hands thoroughly.
 - ◆ Cover your own sores or wounds with a waterproof dressing.
 - ◆ Avoid touching the wound with your fingers while treating it (if possible, use disposable latex gloves).
 - ◆ Don't talk, cough, or breathe over the wound or the dressing.
- For more details, see pages 14 and 215.

MINOR EXTERNAL BLEEDING

Minor bleeding is readily controlled by pressure and elevation. A small adhesive dressing is normally all that is necessary.

Medical aid need only be sought if the bleeding does not stop, or if the wound is at special risk of infection.

TREATMENT

YOUR AIM IS:

- To minimize the risk of infection.

1 Before treating the wound, wash your hands well in soap and warm water. If possible, put on disposable gloves.



Rinse loose foreign particles away with water



2 If the wound is dirty, clean it by rinsing lightly under running water, or use an antiseptic wipe. Pat dry with a gauze swab. Temporarily cover the wound with sterile gauze.

3 Elevate the wounded part above the level of the heart, if possible. Avoid touching the wound directly. Support the affected limb with one hand.

Keep wounded part high



Use clean gauze swab for each stroke



Wipe away from wound

4 Clean the surrounding area with soap and water. Pat dry and remove the covering. Apply an adhesive dressing.

IF there is a special risk of infection, advise the injured to see her doctor.

FOREIGN BODIES IN MINOR WOUNDS

Small pieces of glass or grit that are lying on a wound can be carefully picked off, or rinsed off with cold water before you give any treatment. Use tweezers if you have them. However, you must not attempt to remove objects that are

embedded in the wound; you may cause further damage to the tissue around the injury and aggravate bleeding.

See also:

Fish Hooks, page 177.

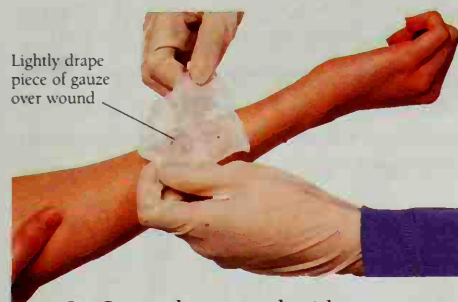
Splinters, page 176.

TREATMENT

YOUR AIMS ARE:

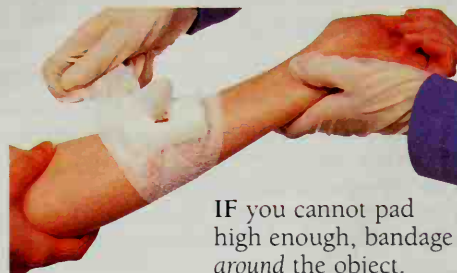
- To control bleeding without pressing the object into the wound.
- To arrange transport to the hospital.

1 Control any bleeding by applying firm pressure on either side of the object, and by raising the wounded part.



2 Cover the wound with gauze to minimize the risk of infection.

3 Pad around the object until you can bandage over it without pressing down. Hold the padding in place while finishing the bandaging.



IF you cannot pad high enough, bandage around the object.

4 Arrange to take or send the injured to the hospital.

BRUISES

These are caused by internal bleeding seeping through the tissues. Bruising can develop slowly, appearing days later. Bruising that develops rapidly and seems to be the main problem will benefit from

first aid, although a bruise can indicate deeper injury. The elderly and those on anticoagulants can bruise easily.

See also:

Internal Bleeding, page 99.

TREATMENT

YOUR AIM IS:

- To reduce blood flow to the injury, and so minimize swelling, by means of cooling and compression.

Raise and support the injured part in a comfortable position. Apply a cold compress (see page 221) to the bruise.

IF you suspect more serious underlying injury, seek medical advice.

INFECTION IN WOUNDS

All open wounds are vulnerable to contamination by microorganisms known as bacteria. These can come from the wounding source, from the air, from breath or the fingers, or from particles of clothing embedded in a wound. Bleeding flushes some of the dirt away and remaining bacteria may be destroyed by the white blood cells.

The dangers of infection

If dirt or dead tissue remain, there may be serious consequences. Bacteria can multiply and spread infection through the body (*septicaemia*), or tetanus infection (see below) can develop. A victim with heavily contaminated or other

susceptible wounds may need antibiotics or antitetanus injections. Wounds that do not begin to heal within 48 hours should be considered to be infected. In these cases, there may also be fever.

Recognition

As infection develops, there may be:

- ◆ Increasing pain and soreness.
- ◆ Swelling, redness, and a feeling of heat around the injury.
- ◆ Pus within, or oozing from, the wound.
- ◆ Swelling and tenderness of the glands in the neck, armpit, or groin.
- ◆ Faint red trails – leading to these glands – on the skin.
- ◆ In advanced infection, signs of fever: sweating, thirst, shivering, and lethargy.

TREATMENT

YOUR AIMS ARE:

- To prevent further infection.
- To obtain appropriate medical aid.



- 1 Cover the wound with a sterile dressing or a clean pad, and bandage it in place.
- 2 Raise and support the injured part to reduce swelling.
- 3 Tell the injured person to see a doctor. If the infection is advanced, call a doctor, or take or send her to the hospital.

TETANUS

This is a dangerous infection that can develop if tetanus bacteria enter a wound. These bacteria are carried in the air and in soil as spores. When present in damaged and swollen tissues, they may release a poisonous substance (*toxin*) that spreads through the nervous system, causing muscle spasms and paralysis.

Preventing tetanus

Tetanus is very difficult to treat, but can be prevented by immunization, which is part of a baby's vaccination program. Children are given boosters on starting and leaving school. Adults should receive boosters every ten years. Always ask a wounded person when he or she last had a tetanus injection. Seek medical advice:

- ◆ if the injured person has never before been immunized;
- ◆ if the last injection was received more than ten years ago;
- ◆ if the injured person cannot remember when the last injection was given.

DISORDERS OF CONSCIOUSNESS

8

The nervous system is the most highly developed system in the body: it controls consciousness, contains centers for memory, speech, and thought, and coordinates the activities of the other body systems.

A fully conscious person is awake, alert, and aware of his or her surroundings. Sleep is a normal state of lowered consciousness, but *unconsciousness* is an abnormal state in which the body's control mechanisms are impaired or lost. When a person is asleep, vital functions such as breathing take place automatically. If a person is unconscious, muscle control is lost, so if the person is lying on his or her back, the tongue falls toward the back of the throat and may block the airway. An unconscious person will therefore require immediate first aid.

Unconsciousness and impaired consciousness

There are a number of disorders that cause varying levels of impaired or lost consciousness; after checking the airway, breathing, and pulse (see page 52), you must establish the *level of (un)consciousness*.

FIRST-AID PRIORITIES

- ◆ Open an unconscious person's airway. Every few minutes, check the airway, breathing, and circulation. Record the breathing and pulse rates.
- ◆ Protect the person from harm.
- ◆ Monitor and *record* the level of response.
- ◆ Look for, and treat, associated injuries.
- ◆ If unconsciousness lasts for more than three minutes, or if you suspect a serious condition such as stroke or skull fracture, arrange urgent transport of the person to the hospital.

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THE NERVOUS SYSTEM

This system consists of the brain and spinal cord (*central nervous system*), the motor and sensory nerves (*peripheral nervous system*), and the *autonomic nervous system*. The central nervous system analyzes

sensory information received via the nerves from all parts of the body and transmits appropriate responses back to the body through the nerves. The autonomic nervous system controls involuntary bodily functions.

CENTRAL NERVOUS SYSTEM

The brain and spinal cord consist of billions of interconnected nerve cells (*neurons*) and are enclosed by three protective membranes (*meninges*). Cerebrospinal fluid flows around the brain and spinal cord and between the meninges, acting as a shock absorber, providing oxygen and nutrients, and removing waste products.

The brain analyzes and acts on most stimuli, but simple reflex actions (*see opposite page*) are controlled solely by the spinal cord. Each side of the brain governs movement in the opposite side of the body, and specialized areas of the brain direct functions such as thinking or vision.

PERIPHERAL NERVOUS SYSTEM

This part of the nervous system consists of two parallel sets of nerves that connect the brain and spinal cord with the body. The cranial nerves emerge in 12 pairs directly from the base of the brain; 31 pairs of spinal nerves branch off at intervals from the spinal cord, passing into the body.

Nerves are like telephone cables, consisting of bundles of nerve fibers capable of relaying both incoming (*sensory*) and outgoing (*motor*) signals.

AUTONOMIC NERVOUS SYSTEM

Some cranial nerves and several small spinal nerves function as the *autonomic*, or *involuntary*, nervous system. This is concerned with vital bodily functions such as the heart rate, breathing, and body temperature. The system has two parts that counterbalance each other.

The sympathetic part prepares the body for action ("fight or flight") by releasing epinephrine (also called *adrenaline*) and related hormones that raise the heart and breathing rates, reduce blood flow to the skin and intestines, and increase sweating.

The parasympathetic part acts in opposition to the sympathetic by releasing other hormones; it also regulates many everyday functions, such as digestion.

WHAT CAN GO WRONG

Injury to the brain or spinal cord is very serious because damaged cells never recover. However, peripheral nerves can regenerate, especially if the severed nerve ends are rejoined surgically soon after an injury; muscle power and sensation may improve over several years.

- ◆ Injury to the brain or spinal cord from violent movement or impact, or pressure from tumors, blood clots, abscesses, or bleeding, may cause reduced sensation or paralysis.
- ◆ Impaired blood or oxygen supply, as occurs in stroke, leads to brain cell death within a few minutes.
- ◆ Infections, such as *meningitis* (*see page 204*), are rare but can be life-threatening.
- ◆ Degenerative diseases, such as *multiple sclerosis* or *Parkinson's disease*, attack the structure of the nerves, causing muscular degeneration.

Other common causes of unconsciousness are discussed in relevant sections of this chapter.

THE NERVOUS SYSTEM

This complex network of nerve cells and fibers carries electrical impulses at speeds of about 125 miles (200 km) per hour, conveying signals between the brain and the rest of the nervous system.

Cranial nerves

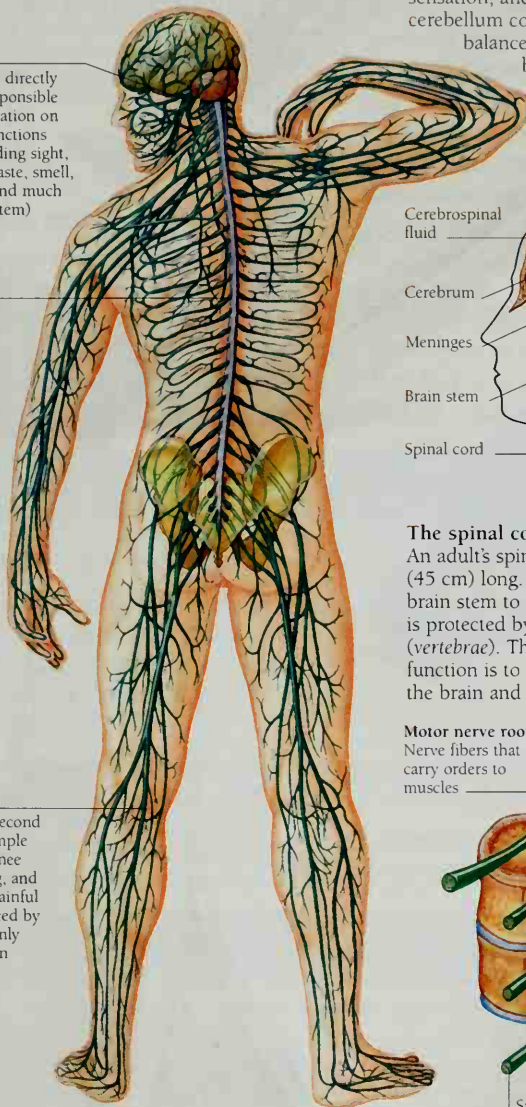
Nerves that extend directly from the brain, responsible for relaying information on most important functions of the body (including sight, hearing, balance, taste, smell, and heart, lungs, and much of the digestive system)

Spinal nerves

Nerves that are connected to brain by "junction boxes" in spinal cord relay sensations to brain and transmit orders from brain to different groups of muscles

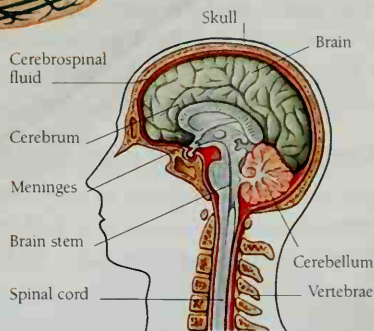
Reflex actions

Involuntary, split-second responses, for example reflexes like the "knee jerk" and coughing, and withdrawal from painful stimuli, are produced by signals that travel only to junction boxes in the spinal cord and back again



The brain

This weighs about 3 lb (1.4 kilos) and is divided into three main structures: the large forebrain (*cerebrum*), the *cerebellum*, and the *brain stem*. The cerebrum controls conscious thought, sensation, and movement; the cerebellum coordinates movement, balance, and posture; and the brain stem deals with basic functions such as breathing and blood pressure.



The spinal cord

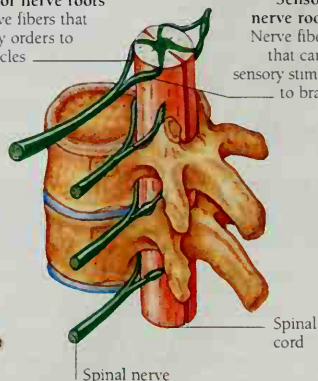
An adult's spinal cord is about 18 in (45 cm) long. It extends from the brain stem to the small of the back and is protected by the bones of the spine (*vertebrae*). The spinal cord's main function is to convey signals between the brain and the peripheral nerves.

Motor nerve roots

Nerve fibers that carry orders to muscles

Sensory nerve roots

Nerve fibers that carry sensory stimuli to brain



UNCONSCIOUSNESS

This results from an interruption of the brain's normal activity. Whatever the cause, follow these three rules:

1: Ensure that the airway is clear

An unconscious person's airway is in constant danger, particularly if he or she is lying face-up. The tongue may flop to the back of the throat and the muscles that normally keep the airway open, and the cough reflex that clears saliva from the throat, will not function. Stomach contents may also be regurgitated and inhaled.

2: Keep checking the response level

There are many degrees of impaired awareness and response short of full unconsciousness (*coma*). Make a rapid

assessment using the "AVPU" code (*below*). Make a detailed assessment using the simplified version of the Glasgow Coma Scale (*see bottom*). Repeat every ten minutes. This checklist is part of the chart on page 112.

THE "AVPU" CODE

A – Alert

V – responds to Voice

P – responds to Pain

U – Unresponsive time.

3: Examine the victim thoroughly

Impaired consciousness can mask other injuries, so a full examination is vital. The person's condition and level of response may alter with time. To avoid aggravating any spinal injury, do not move him or her unnecessarily.

MAJOR CAUSES OF UNCONSCIOUSNESS	
Cause	Effect
Head injury	Direct damage to the brain
Stroke • Fainting • Heart attack • Shock	Interference with blood supply to the brain
Head injury • Stroke • Some infections • Some tumors	Compression of the brain
Low blood oxygen (<i>hypoxia</i>) • Poisoning, including alcohol and drug intoxication • Low blood sugar (<i>hypoglycemia</i>)	Disturbance of chemical content of blood supplied to the brain
Epilepsy • Abnormal body temperature	Seizures

ASSESSING THE LEVEL OF RESPONSE (BASED ON GLASGOW COMA SCALE)		
Eyes – do they:	Movement – does the victim:	Speech – does the victim:
<ul style="list-style-type: none">• Open spontaneously?• Open on command?• Open to a painful stimulus?• Remain closed?	<ul style="list-style-type: none">• Obey commands?• Move in response to a painful stimulus?• Make no response?	<ul style="list-style-type: none">• Respond sensibly to questions?• Appear confused?• Make incomprehensible sounds?• Make no response?

EXAMINING AND TREATING AN UNCONSCIOUS PERSON

YOUR AIMS ARE:

- To maintain an open airway.
- To assess and record the level of response.
- To treat any associated injuries.
- To arrange urgent transport to the hospital.
- To gather and retain any circumstantial evidence of the cause of the condition.

Handle head and neck with care if you suspect spinal injury

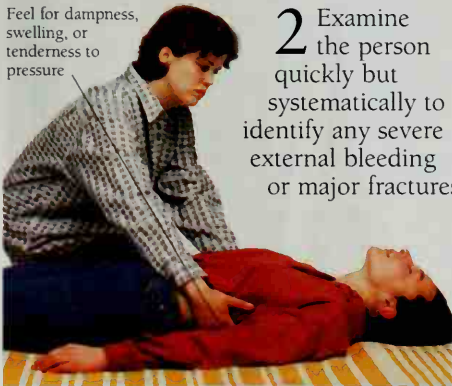


1 Lift chin and tilt head to open airway. Check breathing pulse, and resuscitate if necessary (*see pages 44–58*). Assess and *record* the level of response.

IF she starts to vomit, immediately place her in the recovery position (*see page 48*).

IF you suspect spinal injury, do not bend head and neck back. Treat the person as described on pages 143–7.

Feel for dampness, swelling, or tenderness to pressure



2 Examine the person quickly but systematically to identify any severe external bleeding or major fractures.

DO NOT attempt to give an unconscious person anything by mouth.

DO NOT move the person unnecessarily, because of the possibility of spinal injury. *Never* attempt to make an unconscious person sit or stand upright.

DO NOT leave an unconscious person unattended at any time.

3 Control any bleeding (*see page 88*) and note and protect any suspected fractures (*see pages 123–54*).

4 As you work, look for less obvious injuries or conditions. Smell the victim's breath and look for needle marks, warning bracelets, or cards.

If you do not suspect spinal injury, put in recovery position to maintain open airway



5 Place the person in the recovery position (*see page 48*).

IF the person does not regain consciousness within three minutes,
☎ DIAL 9-1-1 OR CALL EMS.

Monitor and *record* breathing, pulse, and level of response every ten minutes, and send chart with the person to the hospital.

OBSERVATION CHART

The information from this chart will be very valuable when decisions are taken about further treatment:

♦ use a photocopy of it to record your observations while waiting for help;

♦ check the appropriate boxes;
♦ update them at ten-minute intervals;
♦ send the completed chart, and any notes, with the person when he or she leaves your care.

DATE		PERSON'S NAME					
Time of observation (10-minute intervals)		0	10	20	30	40	50
Eyes Observe for reaction while testing other responses.	Open spontaneously						
	Open to speech						
	Open to painful stimulus						
	No response						
Movement Apply painful stimulus: pinch earlobe or skin on back of hand.	Obeys commands						
	Responds to painful stimulus						
	No response						
Speech When testing responses, speak clearly and directly, close to person's ear.	Responds sensibly to questions						
	Seems confused						
	Uses inappropriate words						
	Incomprehensible sounds						
	No response						
Pulse (beats per minute) Take pulse at wrist (see page 77) or at neck on adult (page 52); at inner arm on baby (page 57). Note rate, and whether beats are weak (w) or strong (s), regular (reg), or irregular (irreg).	Over 110						
	101–110						
	91–100						
	81–90						
	71–80						
	61–70						
	Below 61						
Breathing (breaths per minute) Note rate, and whether breathing is quiet (q) or noisy (n), easy (e) or difficult (diff).	Over 40						
	31–40						
	21–30						
	11–20						
	Below 11						

HEAD INJURIES

All injuries to the head are potentially dangerous and require thorough assessment, particularly if the victim's consciousness is impaired; this may indicate damage to the brain, damage to blood vessels inside the skull, or skull fracture. A scalp wound (see page 90) may raise your suspicions, but often deeper, underlying damage

will leave little visible evidence. Conversely, impaired consciousness may mask the presence of other injuries: examine the victim fully. Remember that while unconsciousness can result from a head injury, the victim may have lost consciousness for another reason and have sustained the head injury in a fall.

CONCUSSION

The brain is free to move a little within the skull, and can thus be "shaken" by a violent blow. This may cause concussion, a condition of widespread but temporary disturbance of the brain. There will be a

Recognition

- ◆ Brief or partial loss of consciousness following a blow to the head.

There may also be:

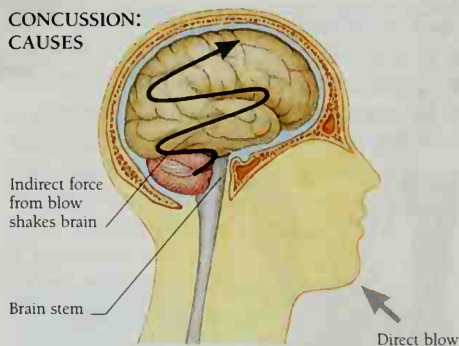
- ◆ Dizziness or nausea on recovery.
- ◆ Loss of memory of events at the time of, or immediately preceding, the injury.
- ◆ A mild, generalized headache.

See also:

Unconsciousness, page 110.

period of confusion or unconsciousness, but it is always brief and is followed by complete recovery – by definition, concussion can only be safely diagnosed once the victim has completely recovered.

CONCUSSION: CAUSES



TREATMENT

YOUR AIMS ARE:

- To ensure that the victim recovers fully and safely.
- If necessary, to seek medical aid.

1 Place an unconscious victim in the recovery position (see page 48). Monitor and record breathing, pulse, and level of response every ten minutes.

IF the victim is confused for more than three minutes or is unconscious, suspect a more serious injury. ☎ **DIAL 9-1-1 OR CALL EMS.**

IF the victim regains consciousness within three minutes, watch closely for any deterioration in the level of response, even after an apparent full recovery.

2 Place the victim in the care of a responsible person. Do not allow a anyone who has been injured on the sports field to continue playing without the approval of a doctor.

3 Advise the victim to seek medical care if headache, vomiting, or other problems occur after the injury. Patients who have been unconscious should be evaluated by a doctor.

SKULL FRACTURE

A head wound may alert you to possible skull fracture; the victim may or may not be unconscious. A skull fracture is dangerous as there may be brain damage. Bacteria that cause infection can enter the brain. Clear fluid (*cerebrospinal fluid*, see page 108) or watery blood leaking from the ear or nose are signs of serious injury and an entry point for bacteria.

Suspect a fractured skull in any victim who has received a head injury resulting in unconsciousness. Bear in mind, however, that if violent head movements (especially “back-and-forth”) have caused unconsciousness, there may also be an associated neck injury.

TREATMENT

YOUR AIMS ARE:

- To resuscitate if necessary.
- To maintain an open airway.
- To arrange transport to the hospital.



1 If the victim is unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Place her in the recovery position (see page 48).

If you suspect spinal injury, treat the victim as described on pages 143–7.

2 Help a conscious victim lie down, with the head and shoulders raised.

Recognition

- ◆ A wound or bruise on the head.
- ◆ A soft area or depression of the scalp.
- ◆ Impairment of consciousness.
- ◆ A progressive deterioration in the level of response.
- ◆ Clear fluid or watery blood coming from the nose or ear.
- ◆ Distortion or lack of symmetry of the head or face.

See also:

Back Injuries, page 142.

Bleeding from the Scalp, page 90.

Unconsciousness, page 110.

If there is discharge from an ear, position the victim so that the affected ear is lower. Cover the ear with a sterile dressing or clean pad, lightly secured with a bandage. Do not plug the ear.

3 Control any bleeding from the scalp. Look for, and treat, other injuries.

☎ DIAL 9-1-1 OR CALL EMS.



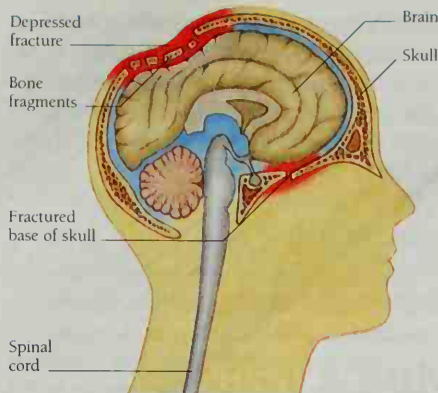
4 Monitor and record breathing, pulse, and level of response every ten minutes until help arrives. Make sure your notes accompany the victim to the hospital.

DIAGNOSIS OF A FRACTURE

Many types of skull fracture, particularly linear fractures (*cracks*) in the domed vault and fractures to the base of the skull, can only be diagnosed by X-ray or other imaging methods in the hospital. Severe injuries may cause multiple cracking ("eggshell" fracture), which may extend to the base of the skull. A depressed fracture may cause bone fragments to be driven in, to injure, and exert damaging pressure on the brain.

Causes of a fracture

A depressed fracture is caused by a direct blow; a fracture of the base of the skull may be caused by landing heavily on the feet or the base of the spine.

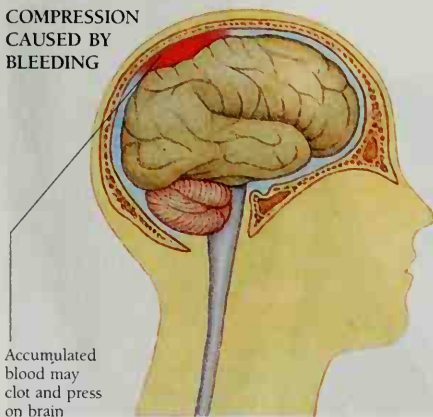


CEREBRAL COMPRESSION

This is a very serious condition that almost invariably requires surgery. It occurs when pressure is exerted on the brain within the skull, for example, by an accumulation of blood or by swelling of an injured brain. It is often associated with head injury and skull fracture, but can be due to other causes, for example, stroke, infection, or tumor.

Cerebral compression may develop immediately after a head injury, or may be delayed for some hours, or even days, so you should always try to find out if there is any recent history of head injury.

COMPRESSION CAUSED BY BLEEDING



Recognition

♦ As the condition develops, the level of response will deteriorate.

There may also be:

- ♦ A recent head injury, followed by an apparently full recovery. Later on, the victim may deteriorate and become disorientated.
- ♦ An intense headache.
- ♦ Drowsiness.
- ♦ A noticeable change in personality or behavior, such as irritability.
- ♦ Noisy breathing, becoming slow.
- ♦ A slow, yet full and strong pulse.
- ♦ Unequal or dilated pupils.
- ♦ Weakness or paralysis down one side of the face or body.

TREATMENT

☎ DIAL 9-1-1 OR CALL EMS.

IF the victim is unconscious, follow the treatment on page 111.

IF the victim is conscious, support him or her in a comfortable position. Monitor and *record* breathing, pulse, and level of response every ten minutes.

CONVULSIONS

A convulsion, or seizure, consists of involuntary contractions of many of the muscles in the body, caused by a disturbance in the function of the brain. Convulsions usually result in loss of, or impaired, consciousness.

There are a number of possible causes, including head injury, some brain-damaging diseases, shortage of oxygen to the brain, and the intake

of certain poisons. In babies and young children, seizures may be triggered by a high temperature. Seizures are also a feature of *epilepsy*.

No matter what the cause of the seizure, you must observe the three rules for treating an unconscious victim (*see page 110*), protect him or her from further harm during a seizure, and arrange for aftercare.

MINOR EPILEPSY

Short of major epilepsy, there are many forms of epilepsy, including *absence seizures* which cause only a brief blurring of consciousness, like daydreaming. On recovery, the person may simply have lost the thread of what he or she was doing. The level of consciousness varies in all forms of minor epilepsy, but a major seizure sometimes follows a minor one.

Recognition

There may be:

- ◆ Sudden "switching off," the person may be staring blankly ahead.
- ◆ Slight or localized twitching or jerking of the lips, eyelids, head, or limbs.
- ◆ Odd "automatic" movements, such as lip-smacking, chewing, or making noises.

TREATMENT

YOUR AIM IS:

- To protect the person until she is fully recovered.

1 Help the person sit down in a quiet place. Remove any possible sources of harm, for example hot drinks or sharp objects, from the immediate vicinity.

2 Talk to her calmly and reassuringly. Do not pester her with questions. Stay with her until you are sure she is herself again.

IF the person does not recognize and know about her condition, she should be evaluated by a doctor as soon as possible.

Reassure person, who may be confused and disorientated



MAJOR EPILEPSY

This condition is characterized by recurrent, major disturbances of brain activity, resulting in violent seizures (*tonic-clonic*) and severe impairment of consciousness. Epileptic seizures can be sudden and dramatic, but the person may have a brief warning period (*aura*) with, for example, a strange feeling or a special smell or taste.

Recognition

Epileptic seizures often follow a pattern:

- ◆ The victim suddenly falls unconscious, often letting out a cry.
- ◆ He becomes rigid, arching his back (this is known as the *tonic* phase).
- ◆ Breathing may cease. The lips may

show a gray-blue tinge (*cyanosis*) and the face and neck may become congested.

◆ Convulsive movements begin (the *clonic* phase). The jaw may be clenched and breathing may be noisy. Saliva may appear at the mouth, blood-stained if lips or tongue have been bitten. There may be loss of bladder or bowel control.

◆ The muscles relax and breathing becomes normal; the victim recovers consciousness, usually within a few minutes. He may feel dazed, or behave strangely in a state of "automatism," being unaware of his actions. A seizure may also be followed by a deep sleep.

◆ There may be evidence of injury, such as burns or scars, from previous seizures.

TREATMENT

YOUR AIMS ARE:

- To protect the victim from injury while the seizure lasts.
- To provide care when consciousness has been regained.

DO NOT lift or move the victim unless he is in immediate danger.

DO NOT use force to restrain him, or put anything in his mouth.

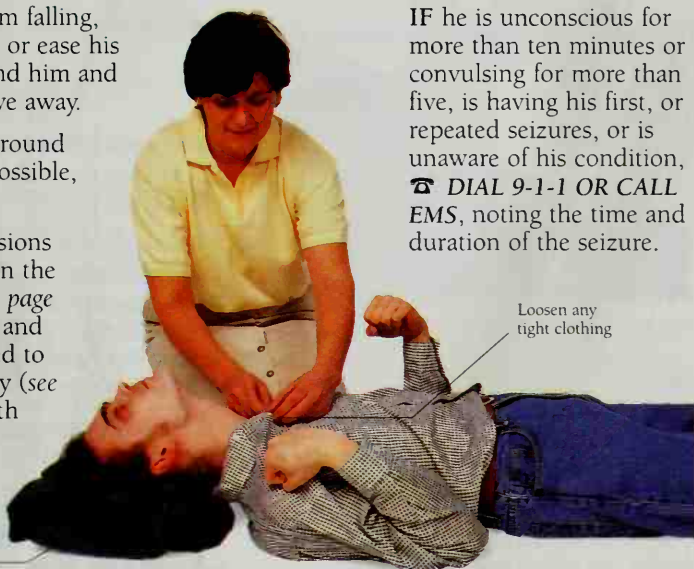
1 If you see the victim falling, try to support him or ease his fall. Make space around him and ask bystanders to move away.

2 Loosen clothing around his neck and, if possible, protect his head.

3 When the convulsions cease, place him in the recovery position (see page 48). Check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Stay with him until he is fully recovered.

IF he is unconscious for more than ten minutes or convulsing for more than five, is having his first, or repeated seizures, or is unaware of his condition,
☎ DIAL 9-1-1 OR CALL EMS, noting the time and duration of the seizure.

If possible, put something soft under or around his head



CONVULSIONS IN YOUNG CHILDREN

Although young children can have epileptic seizures just like adults (see page 116), more commonly they develop seizures at the onset of an infectious disease, such as a viral illness, or a throat or ear infection associated with a high temperature or fever (*febrile convulsion*).

These convulsions can be alarming, but they are rarely dangerous if properly managed. For safety's sake, the child should be seen by a doctor to rule out any serious condition. This may be upsetting if you are the child's parent, but be reassured that, in nearly all cases, no problems occur once the seizure passes.

TREATMENT

YOUR AIMS ARE:

- To protect the child from injury.
- To cool the child.
- To reassure the parents.
- To arrange transport to the hospital.



1 Remove any clothes or covering bedclothes. Ensure a good supply of cool, fresh air (although you should be careful not to overcool the child).

Recognition

- ◆ Clear signs of fever: hot, flushed skin, and perhaps sweating.
- ◆ Violent muscle twitching, with clenched fists and an arched back.

There may also be:

- ◆ Twitching of the face with squinting, fixed, or upturned eyes.
- ◆ Breath-holding, with congested face and neck or drooling at the mouth.
- ◆ Loss of, or altered, consciousness.

See also:

Unconsciousness, page 110.



2 Position pillows or soft padding around the child so that even violent movement will not result in injury.

3 Sponge the child with tepid water to help cooling; start at her head and work down.



4 Keep the airway open, by using the recovery position (page 48) if possible.

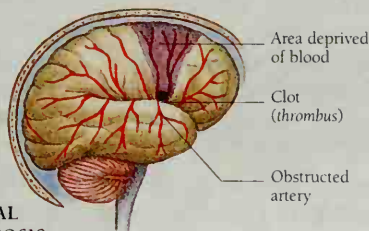
☎ DIAL 9-1-1 OR CALL EMS.

5 Reassure the child and parents or caregiver until the ambulance arrives.

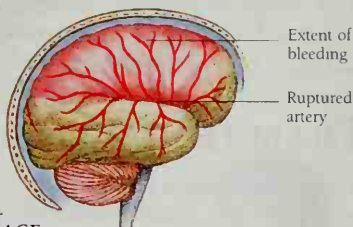
STROKE

This term is used to describe a condition in which the blood supply to part of the brain is suddenly and seriously impaired by a blood clot (*thrombosis*) or a ruptured artery (*hemorrhage*).

Strokes are more common in later life, and in those who suffer from high blood pressure or some other circulatory disorder. The effect of a stroke depends on how much, and which part, of the brain is affected. Major strokes can be fatal, but many people make complete recoveries from minor strokes.



CEREBRAL
THROMBOSIS



CEREBRAL
HEMORRHAGE

Recognition

There may be:

- ◆ A sudden, severe headache.
- ◆ A confused, emotional mental state that could be mistaken for drunkenness.
- ◆ Sudden or gradual loss of consciousness.
- ◆ Signs of weakness or paralysis, possibly on one side of the body, such as a drooping, dribbling mouth; slurred speech; loss of power or movement in the limbs; pupils of unequal size; loss of bladder or bowel control.

See also:

Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To maintain an open airway.
- To minimize brain damage.
- To arrange urgent transport of the victim to the hospital.

FOR AN UNCONSCIOUS VICTIM

1 Open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Place her in the recovery position (see page 48).

2 Monitor and *record* breathing, pulse, and level of response every ten minutes.

3 Loosen any clothing that might impede the victim's breathing.

☎ **DIAL 9-1-1 OR CALL EMS.**

FOR A CONSCIOUS VICTIM



Lay her down with her head and shoulders slightly raised and supported. Incline her head to one side, and place a towel or cloth on her shoulder to absorb any dribbling.

☎ **DIAL 9-1-1 OR CALL EMS.**

DO NOT give the victim anything to eat or drink.

OTHER DISORDERS

The nervous system is vulnerable to disorder and damage not only by physical injury and disruptive conditions such as epilepsy, but also by changes in the composition of the blood supplied to the brain.

Chemical changes to which the brain is particularly sensitive include an insufficiency of oxygen in the blood (see page 62), altered blood sugar levels, or the presence of toxins such as poisons, alcohol, or drugs.

The problems of substance abuse

The abuse of alcohol, drugs, and other substances is an emotional subject, but you must never let your

feelings on this subject impair your judgment and management of the unconscious victim. He or she may be doubly at risk – from the dangers of unconsciousness as well as from the effects of the intoxicating substance.

The importance of examination

Remember that the symptoms and signs of conditions such as stroke and diabetic emergency can closely resemble, and easily be mistaken for, intoxication. You should, having ensured an open airway and breathing, examine every such victim thoroughly to check for other possible causes.

DIABETES MELLITUS

This is a condition in which the body fails to regulate the concentration of sugar (*glucose*) in the blood. Blood-sugar levels are normally controlled by a hormone (*insulin*) produced by the pancreas.

Without insulin, sugar accumulates in the blood, and can cause *hyperglycemia* (see below). Diabetics must carefully balance the amount of sugar in their diet

and regulate their blood sugar with tablets or insulin injections; too much insulin or too little sugar can cause *hypoglycemia* (see opposite).

Most diabetics are aware of the risk of hypoglycemia if, for example, they miss a meal or overexert themselves, and may carry sweet food or candy to raise their blood-sugar level quickly.

HYPERGLYCEMIA

Prolonged high blood sugar can result in unconsciousness and then diabetic coma, although a diabetic often drifts into this state over a few days. This condition requires urgent medical treatment with insulin and intravenous infusion of fluids.

Recognition

- ◆ Dry skin and a rapid pulse.
- ◆ Deep, labored breathing.
- ◆ A faint smell of acetone (as in nail-polish remover) on the person's breath.

TREATMENT

YOUR AIM IS:

- To arrange urgent transport of the victim to the hospital.

☎ DIAL 9-1-1 OR CALL EMS.

Treat unconscious person as detailed on page 111. Check condition every ten minutes, until help arrives.

HYPOGLYCEMIA

When the blood-sugar level falls below normal (*hypoglycemia*), brain function is affected rapidly. This can occur in sufferers of *diabetes mellitus* and, more occasionally, accompany an epileptic seizure or follow an episode of binge drinking. Hypoglycemia can also complicate heat exhaustion or hypothermia.

Diabetics may carry their own blood-testing kits with which to check their blood-sugar levels, and are usually well prepared for emergencies. If the "hypo" attack is advanced, however, consciousness may be impaired or lost.

Recognition

There may be:

- ◆ A history of diabetes; the person will sometimes, but not always, recognize the onset of a "hypo" attack.

- ◆ Weakness, faintness, or hunger.
- ◆ Palpitations and muscle tremors.
- ◆ Strange actions or behavior; the person may seem confused, belligerent, or may even be violent.
- ◆ Sweating.
- ◆ Pallor.
- ◆ Cold, clammy skin.
- ◆ A strong, bounding pulse.
- ◆ A deteriorating level of response.
- ◆ Shallow breathing.
- ◆ A diabetic's medic-alert bracelet, sugar candy, tablets, or an insulin syringe (which may look like a pen) among the person's possessions.

See also:

Convulsions, page 116.
Heat Exhaustion, page 173.
Hypothermia, page 170.
Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To raise the sugar content of the blood as quickly as possible.
- To obtain appropriate medical aid.

FOR AN UNCONSCIOUS VICTIM



1 Open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Place the victim in recovery position (see page 48).

2 Record breathing, pulse, and response every ten minutes.

☎ DIAL 9-1-1 OR CALL EMS.

FOR A CONSCIOUS PERSON



1 Help the person sit or lie down, and give her a sweet drink, some chocolate, or other sweet food.

2 If the person responds quickly, give more food or drink, and let her rest until she feels better. Tell her to see her doctor even if she feels fully recovered.

IF her condition does not improve, examine her for other causes of tremor and confusion, and treat as necessary.

☎ DIAL 9-1-1 OR CALL EMS.

DRUNKENNESS

The unconscious person who has drunk excessive alcohol risks a blocked airway, especially if he is lying face-up or has vomited. There may be head or neck injuries resulting from an assault or fall, or a stroke may have occurred. Seizures (*see page 116*) are common in binge drinking. There is also a risk of hypothermia and hypoglycemia.

See also:

Alcohol Poisoning, *page 188.*

Hypothermia, *page 170.*

Hypoglycemia, *page 121*

Stroke, *page 119.*

Unconsciousness, *page 110.*

TREATMENT

YOUR AIMS ARE:

- To maintain an open airway.
- To obtain medical aid if necessary.

1 Open the person's airway by lifting the chin and tilting the head (*see page 47*). Make sure that there is no vomit causing an obstruction in the airway.

IF the person starts to vomit, place him in the recovery position (*see page 48*) immediately to drain his mouth, and check that his airway is still clear.

2 Check the person's breathing, pulse, and level of response (*see page 46*), and be prepared to resuscitate if necessary (*see pages 44–58*).

3 Place or keep the person in the recovery position (*see page 48*). Keep a close watch on his condition; monitor and *record* breathing, pulse, and level of response every ten minutes. If in doubt, take or send the person to the hospital.

4 Keep the person warm, especially in cold, wet conditions.

IF the person is totally unresponsive (for example, to a firm pinch on the hand) or is having seizures,

☎ DIAL 9-1-1 OR CALL EMS.

SUBSTANCE ABUSE

A variety of illicit or prescribed drugs and substances may be taken by accident, for “kicks” or in a suicide attempt, by mouth, by injection or by inhalation (“snorting”). Some drugs can cause unconsciousness and severely impair breathing. If you are in doubt about the cause of unconsciousness, particularly if treating a person in unusual circumstances, suspect drug abuse or overdose.

See also:

Drug Poisoning, *page 186.*

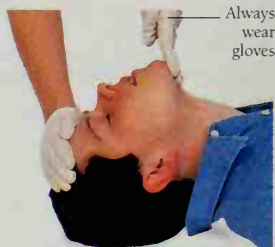
Unconsciousness, *page 110.*

TREATMENT

YOUR AIMS ARE:

- To maintain an open airway.
- To arrange transport to the hospital.

1 Open the airway, and check breathing, pulse, and level of response. Be prepared to resuscitate if necessary (*see pages 44–58*).



Put in recovery position to help breathing



2 Place the person in the recovery position (*see page 48*).

☎ DIAL 9-1-1 OR CALL EMS.

3 Monitor and *record* breathing, pulse, and level of response every ten minutes.

BONE, JOINT, AND MUSCLE INJURIES

9

The skeleton is the hard framework around which the body is constructed, and on which all the body's tissues depend for support. The skeleton is jointed in many places, and muscles attached to the bones enable them to move. Most of these movements are controlled at will, and coordinated by impulses that travel from the brain via nerves to every muscle and joint in the body.

Diagnosing types of injuries

It can be difficult to distinguish between bone, joint, and muscle injuries, so it helps to understand how the bones and muscles attached to them function, and how and why injury can happen. This information is given here, together with the general principles of treatment for different types of injuries. You will also find specific first-aid treatments for injuries to bones, joints, and muscles in every part of the body, from top to toe.

The only type of fracture not covered in these pages is skull fracture, which, because of the potential effect on the brain, is discussed in the chapter *Disorders of Consciousness* (pages 107–22).

FIRST-AID PRIORITIES

- ◆ Maintain an open airway.
- ◆ Steady and support the injured part, if possible.
- ◆ Provide more permanent support, with padding and firm bandaging or splinting. An uninjured part of the body is the best form of “splint.”
- ◆ If a broken bone lies within a large bulk of tissue (for example, the thigh), treat the victim for shock.
- ◆ Obtain appropriate medical treatment.

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BONES, JOINTS, AND MUSCLES

The body is built on a framework of bones – the skeleton – that supports the muscles, blood vessels, and nerves of the body, and protects

organs such as the heart. Movement is made possible by muscles attached to the bones, and by movable joints where the bones meet.

THE SKELETON

The bones of the skeleton are composed of calcium and phosphorus, which makes them hard and rigid, providing a protective framework for the body.

Upper limb

Collarbone and shoulder blade form shoulder girdle, which is attached at shoulder joint to upper arm bone

Rib cage

Cage made of twelve pairs of curved ribs attached to spine at back; ten are also attached by cartilage to breastbone at front. Rib cage protects vital organs and moves to accommodate lungs during breathing

Spine

Column of small bones (vertebrae) that protects spinal cord

Pelvis

Basin-shaped structure, attached to lower part of spine, protects lower abdominal organs

Lower limb

Bones of lower limb join pelvis at hip joint and are jointed at knee and ankle

Bones of the head
Main bones are skull (domed vault that protects brain) and hinged jawbone

Jawbone (mandible)

Collarbone (clavicle)

Shoulder blade (scapula)

Breastbone (sternum)

Upper arm bone (humerus)

Ulna

Radius

Wrist bones (carpals)

Hand bones (metacarpals and phalanges)

Thigh bone (femur)

Kneecap (patella)

Shinbone (tibia)

Splint bone (fibula)

Ankle bones (tarsals)

Foot bones (metatarsals and phalanges)

THE JOINTS

Wherever one bone meets another, there is a movable or immovable joint.

Immovable joints are those where the bone edges fit firmly into each other, or are fused together, like the pelvic bones.

Movable joints allow movement between adjacent bones and are of three types: slightly movable, ball-and-socket, and hinge joints (*see below*). The degree of movement depends on the shape of the bone ends, the arrangement of muscles controlling the limb, and the strength of the surrounding ligaments.



Slightly movable joints

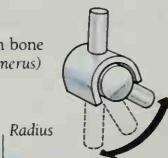
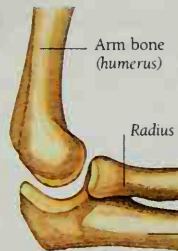
These allow only slight gliding or rocking movements. Examples are joints between the spinal vertebrae and in the feet.



Arm bone (humerus)



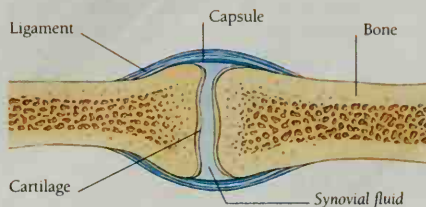
Shoulder blade (scapula)



Ulna

Hinge joints

The bone ends are contoured to allow bending (flexion) and straightening (extension) in only one plane, as in the elbow.



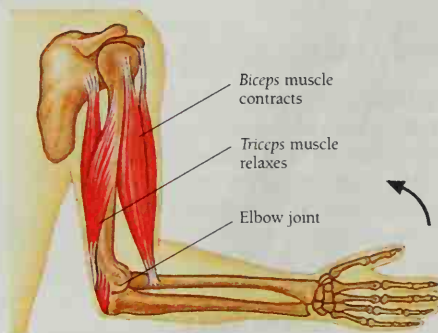
Cross section of a movable joint

Smooth cartilage covering the bone ends minimizes friction. Elastic bands of tissue (ligaments) hold the ends together. The joint is enclosed in a capsule filled with a lubricant (synovial fluid).

THE MUSCLES

Muscles cause the various parts of the body to move. Skeletal (voluntary) muscles are controlled at will. They are attached to the bones by bands of strong, fibrous tissue (tendons), and operate in groups; as one group of muscles contracts, its paired group relaxes. Muscles also work constantly to maintain the position or stability of the body.

Smooth (involuntary) muscles operate the internal organs, such as the heart, and work constantly, even when we are asleep. They are controlled by the autonomic nervous system (*see page 108*).



How voluntary muscles of the arm work

The biceps contracts, drawing the lower arm toward it. At the same time, its opposite muscle, the triceps, relaxes to allow the arm to bend.

TYPES OF INJURIES

Bones may be broken (fractured), displaced at a joint (dislocated), or both. Muscles and the tendons that attach them to bones may be strained or torn, and the ligaments

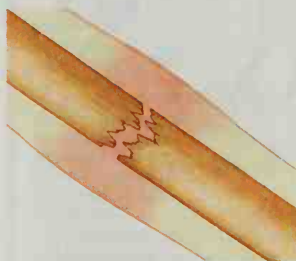
holding the joints together can tear. If you have any doubt about which type of injury you are dealing with, it is best to assume it is the most serious, which is generally a fracture.

FRACTURES

A fracture is a break or crack in a bone. Bones are not brittle structures like blackboard chalk, but are tough and resilient. When struck or twisted, bones bend like the branches of a healthy tree. Generally, considerable force is required to break a bone, unless it is diseased or old (*see opposite page*). Conversely, young

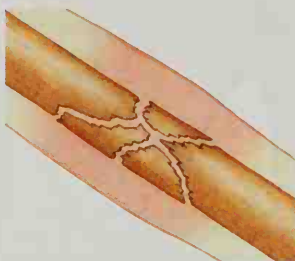
bones that are still growing are supple and may split, bend, or crack just like a young sapling – hence the name “greenstick fracture” for this type of injury.

Any type of fracture may be accompanied by an open wound, and complicated by injury to adjoining nerves, muscles, blood vessels, and organs.



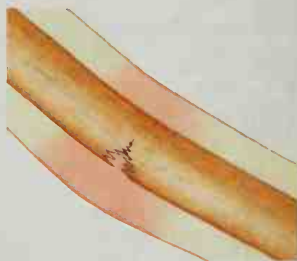
Simple fracture

This is a clean break or a crack in the bone.



Comminuted fracture

This type of fracture produces multiple bone fragments.



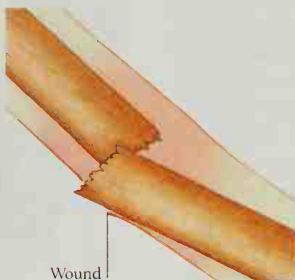
Greenstick fracture

A split in a young, immature bone is common in children.

OPEN AND CLOSED FRACTURES

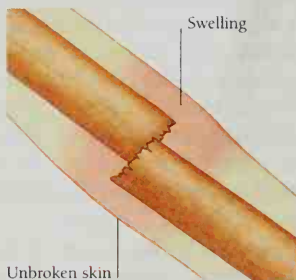
In an *open* (compound) fracture, part of the bone breaks through the skin, causing bleeding. The exposed bone is vulnerable to contamination from bacteria on the skin surface and in the air.

When the skin around a broken bone is intact, the injury is known as a *closed* fracture. There will often be bruising and swelling around the fracture site.



Open fracture

The wound may be caused by the injuring force, or by internal bone fragments perforating the skin.



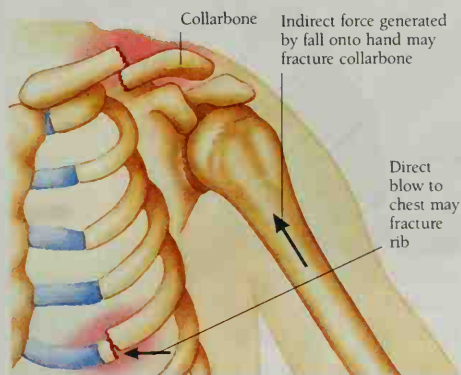
Closed fracture

The surrounding skin is unbroken, but internal injury to surrounding tissues may cause local swelling.

HOW FRACTURES ARE CAUSED

Both direct and indirect force can cause bones to fracture. A bone may break at the point where a heavy blow is received. For example, the direct impact of a moving vehicle's bumper can break the shinbone.

Indirect force may be produced by a twist or a wrench: a trip or stumble can break a leg bone, for example. Force may travel from the point of impact through the body to break bones elsewhere. Rarely, violent muscle contraction can fracture a bone to which the muscle is attached.



OLD OR DISEASED BONES

Age and disease can weaken bones, making them brittle and susceptible to breaking or crumbling when stressed. Such conditions include:

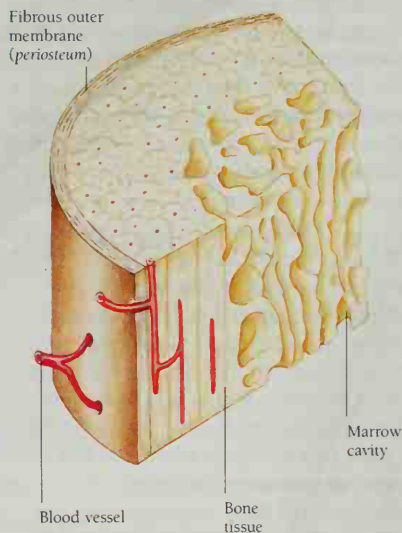
- ◆ osteoporosis, a condition where the bone loses density, usually in old age;
 - ◆ congenital abnormalities, in which bones are naturally brittle;
 - ◆ benign or cancerous tumors or cysts.
- With any of these conditions, a simple movement may result in a spontaneous fracture, often causing severe pain.

People who are known to have a susceptibility to breaks or fractures should always be handled with care. Remember to move old people carefully, even if there is no history of violent injury or movement to the bones.

BONE STRUCTURE

Bones can be long, short, or flat. They have blood vessels that supply the inner cells and are dense and heavy because they are mainly composed of calcium. Bones grow from birth to early adulthood by continually laying down calcium on the outside. They are also able to generate new tissue after an injury.

Bones are vulnerable during the growing process, and any damage occurring during childhood and adolescence can lead to a shortened bone or impaired movement.



BONES OF THE SKULL

By adulthood, the bones of the skull fuse together to form a protective casing for the brain and the top of the spinal cord.

Within the bone are air spaces (sinuses) that lighten the skull. Sinuses are weak points in the skull and, if fractured, can allow the cerebrospinal fluid that cushions the brain (see page 108) to leak out. This is a serious injury because the brain may become infected.

It is not uncommon for broken bones around the eye socket to be mistaken for a simple black eye because bruising can disguise this type of fracture.

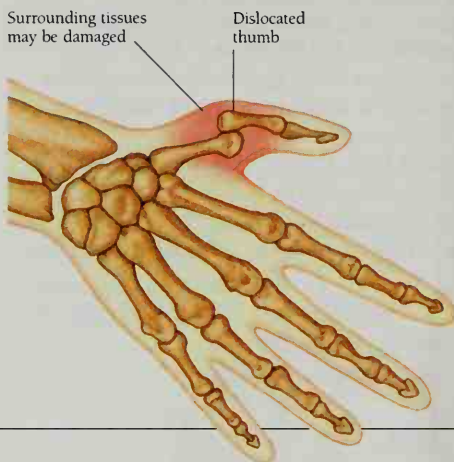
DISLOCATIONS

This is partial or full displacement of bones at a joint. There may be an associated fracture, tearing of the ligaments (see below), or damage to the membrane that encases the joint (*joint capsule*).

Dislocation can be caused by a strong force wrenching the bone into an abnormal position, or by violent muscle contraction. This very painful injury most often occurs to the shoulder, thumb, finger, and jaw.

If the spine is dislocated, the spinal cord can be injured, and shoulder or hip dislocation may damage major nerves to the limbs and result in paralysis. A severe dislocation of any joint may also fracture the bones involved. It can often be difficult to distinguish a dislocation

from a fracture. Never try to manipulate a dislocated joint back into place because this may cause further injury.



SOFT TISSUE INJURIES

These are injuries that affect the ligaments and muscles. A sprain is an injury to a ligament at or near a joint. It is often the result of a sudden or unexpected wrenching movement at the joint that pulls the bones within the joint too far apart and tears the tissues surrounding the joint.

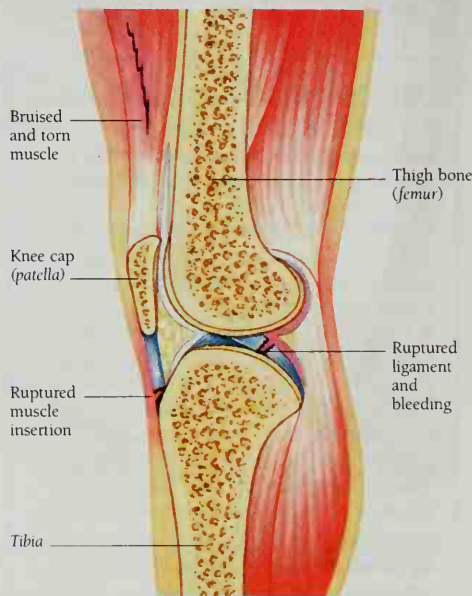
Muscles and their tendons may be overstretched and torn by violent or sudden movement. Damage to muscle tissue can occur in one of three ways.

- ◆ **Strain:** overstretching of the muscle, which may result in a partial tearing or pull. This often occurs at the junction of the muscle and the tendon that joins it to a bone.

- ◆ **Rupture:** complete tearing of the muscle, which may occur in the fleshy part or in the tendon.

- ◆ **Deep bruising:** this may be extensive in parts of the body where there is a large bulk of muscle. These injuries are usually accompanied by bleeding into the damaged area, which can lead to pain, swelling, and bruising.

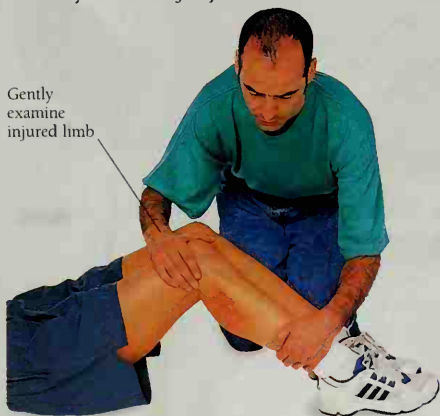
Strains and ruptures are frequently suffered by athletes; ligament strains and muscle tears are also common causes of nonspecific back pain.



ASSESSMENT OF BONE, JOINT, AND MUSCLE INJURIES

Some injuries, such as an open fracture or a dislocated thumb, are obvious. Others may only be revealed by X ray examination. When you are assessing an injury, note as many features as possible, without moving the injured part unnecessarily. Try to visualize how the injury was caused and how much force might have been involved.

Compare the shape, position, and appearance of the injured part with the uninjured side. If in doubt about the severity of an injury, treat it as a fracture.



Recognition

There may have been:

- ◆ A recent violent blow or a fall.
- ◆ The snapping sound of a broken bone or torn ligament.
- ◆ The sharp pain of a muscle tear.

There may also be:

- ◆ Difficulty in moving a limb normally, or at all (for example, inability to walk).
- ◆ Pain at or near the site of injury, made worse by movement. "Sickening" and severe pain often indicates dislocation; tenderness over a bone if gently touched is a sign of fracture.
- ◆ Distortion, swelling, and bruising at the site of the fracture.
- ◆ Coarse grating of the bone ends (*crepitus*) may be heard or felt – do not try to produce this deliberately.
- ◆ Signs of shock, if the fracture is to the thigh bone, rib cage, or pelvis.
- ◆ A shortening, bending, or twisting of the affected limb.

See also:

Shock, page 78.

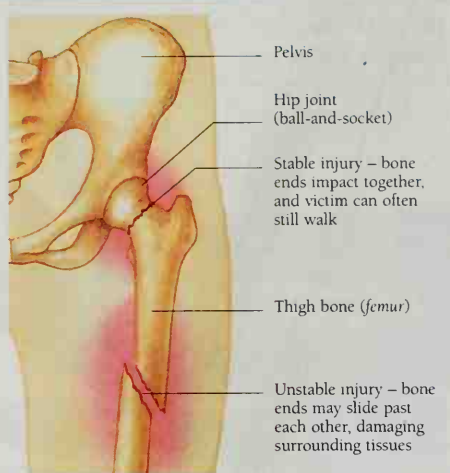
STABLE AND UNSTABLE INJURIES

Stable injuries

The force causing what is known as a "stable injury" may either fail to break the bone completely or may act in such a way that the broken ends are jammed together or impacted. Such injuries are fairly common at the wrist, shoulder, ankle, and hip. Because there is little movement at the site, stable injuries can usually be gently handled without causing more damage.

Unstable injuries

With this injury, the bone is completely broken, or the ligaments are ruptured, in such a way that a broken bone or bone end may become displaced. Handle such injuries carefully to avoid causing further damage.



TREATMENT FOR OPEN FRACTURES

YOUR AIMS ARE:

- To prevent blood loss, movement, and infection at the site of injury.
- To arrange transport to the hospital, with comfortable support during the trip.

IF you can, get a helper to support the limb while you work on the wound.

1 Cover the wound with a clean pad or sterile dressing, and apply pressure to control the bleeding (see page 88).



DO NOT press down directly on a protruding bone end.



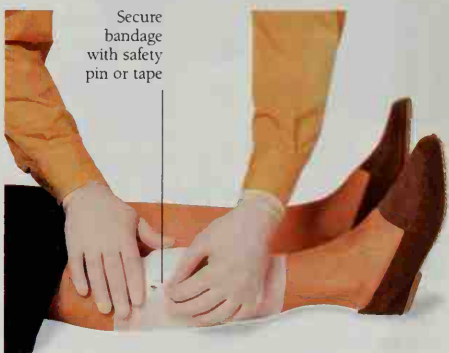
2 Without touching an open wound with your fingers, carefully place cotton or some other clean padding over and around the dressing.

DO NOT move the person until the injured part is secured and supported, unless she is in danger.

DO NOT let the person have anything to eat or drink.



IF bone is protruding, build up pads of soft, nonfluffy material around the bone until you can bandage over the pads.



3 Secure the dressing and padding; bandage firmly, but not so tightly that the circulation is impeded.

4 Immobilize the injured part as for a closed fracture (see opposite page).

☎ DIAL 9-1-1 OR CALL EMS.

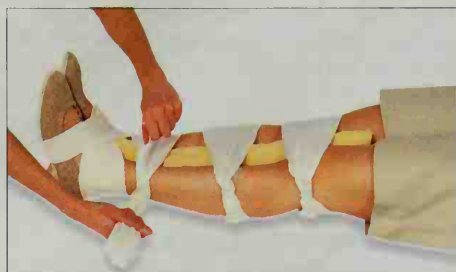
5 Treat for shock (see page 78). Check the circulation beyond the bandage (see page 223) every ten minutes.

TREATMENT FOR CLOSED FRACTURES AND DISLOCATIONS

YOUR AIMS ARE:

- To prevent movement at the injury site.
- To arrange transport to the hospital, with comfortable support during the trip.

1 Tell the victim to keep still, and steady and support the injured part with your hands until it is immobilized.



2 For firmer support, secure the injured part to an uninjured part of the body. Bandage from the uninjured side.

- ◆ For upper limb fractures, always support the arm against the trunk with a sling and, if needed, bandaging (see page 137).
- ◆ For lower limb fractures, if transport to the hospital is delayed, bandage the uninjured leg to the injured one (see page 150).

DO NOT move the victim until the injured part is secured and supported, unless she is in danger.

DO NOT let the victim eat or drink.

DO NOT try to replace a dislocated bone into its socket.

3 **DIAL 9-1-1 OR CALL EMS.**

Treat the victim for shock (see page 78). Raise the injured limb if possible.

4 Check the circulation beyond any bandages (see page 223) every ten minutes, and loosen if necessary.

TRACTION

If a fractured limb is bent or angled so it cannot be immobilized, apply gentle traction to pull it straight. This overcomes the pull of the muscles and reduces pain and bleeding at the fracture site.

To apply traction, pull steadily in the line of the bone until the limb is securely immobilized. You can do no harm if you pull only in a straight line, but **DO NOT** persist if traction causes pain.



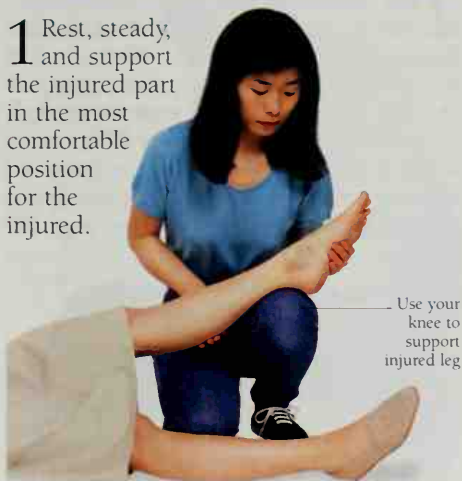
TREATMENT FOR SOFT TISSUE INJURIES

Follow the "RICE" procedure (see right) to treat sprains, strains, and deep bruising initially. This treatment may be sufficient, but if you are in doubt as to the severity of the injury, treat it as a fracture (see page 130).

YOUR AIMS ARE:

- To reduce swelling and pain.
- To obtain medical aid if necessary.

1 Rest, steady, and support the injured part in the most comfortable position for the injured.



2 If the injury has just happened, cool the area by applying an ice pack or cold compress (see page 221). This will reduce swelling, bruising, and pain.

THE RICE PROCEDURE

- R** Rest the injured part.
- I** Apply Ice or a cold compress.
- C** Compress the injury.
- E** Elevate the injured part.



3 Apply gentle, even pressure, or compression, to the injured part by surrounding the area with a thick layer of soft padding, such as a towel or thick cloth, secured with a bandage.

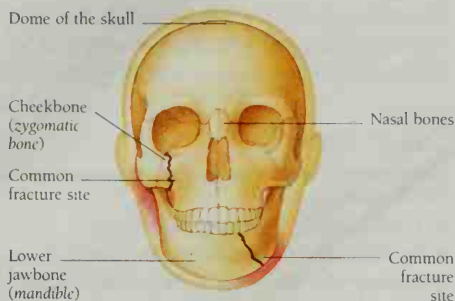


4 Raise and support the injured limb, to reduce blood flow to the injury and to minimize bruising.

5 Take or send the injured to the hospital or, if the injury seems very minor, advise her to rest the injured part and to see her doctor if necessary.

INJURIES TO THE FACE AND JAW

Common injuries to the face include a broken nose, cheekbone, or jaw. The jaw can also be dislocated. The main danger is obstruction of the airway, either by swollen, displaced, or lacerated tissue, by loose teeth, or by blood and saliva (because the injured cannot swallow adequately). There may also be damage to the brain, skull, or neck.



MAJOR FACIAL FRACTURES

Serious or combined facial fractures may appear horrifying, with distortion of the eye sockets, nose, upper teeth, and palate. Swelling and bruising may rapidly develop, and bleeding may occur from the nose or mouth, or displaced tissue. The danger is that these may cause

breathing difficulties. Check also for signs of head and neck injury. Take care not to dismiss a facial fracture as a black eye (see page 127).

See also:

Head Injuries, page 113.

Spinal Injury, page 143.

TREATMENT

YOUR AIMS ARE:

- To keep the airway open.
- To arrange transport to the hospital.
- To prevent further injury.

IF UNCONSCIOUS

1 A spinal injury may be present. Open and clear the airway (see page 47).

2 Support the head and neck in the neutral position (see page 144).

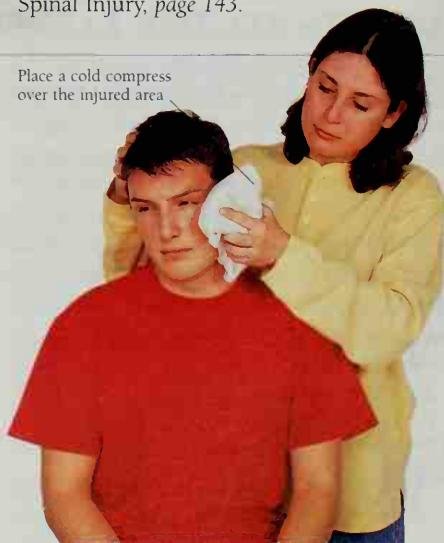
☎ DIAL 9-1-1 OR CALL EMS.

IF CONSCIOUS

1 Clear person's mouth of blood, broken teeth, or dentures (see page 101).

2 Apply direct pressure to any wound with your fingers or palm, preferably over a sterile dressing or clean pad (see page 88), then dress the wounds.

Place a cold compress over the injured area



3 Place an ice pack or cold compress (see page 221) over the injured area to help reduce swelling and pain. Frozen vegetables wrapped in a cloth will do.

4 Take or send the injured person to the hospital.

CHEEKBONE AND NOSE FRACTURES

Fractures of the cheekbone and nose are common, and are usually the result of fighting. The associated swelling is

uncomfortable, and may block the air passages in the nose. These injuries should always be checked at the hospital.

TREATMENT

YOUR AIMS ARE:

- To minimize pain and swelling.
- To arrange transport to the hospital.

- 1 Quickly apply a cold compress (see page 221) to the injured area in order to reduce swelling.
- 2 Treat an associated nosebleed if necessary (see page 102).
- 3 Arrange to take or send the injured to the hospital.

IF straw-colored (*cerebrospinal*) fluid leaks from the nose, treat as for skull fracture (see page 114).

The injured may prefer to apply compress himself

Use dishcloth wrapped around bag of ice



INJURIES TO THE LOWER JAW

Jaw fractures are usually the result of direct force, such as a heavy blow to the jaw. Because of its shape, a blow to one side of the jaw may cause a fracture on the other side. A fall onto the point of the chin can fracture both sides. A blow, or even yawning, may dislocate the jaw.

Recognition

There may be:

- ◆ Pain and nausea when moving the jaw.
- ◆ Distortion of the teeth and dribbling.
- ◆ Swelling, tenderness, and bruising.
- ◆ A wound or bruising inside the mouth.

TREATMENT

YOUR AIMS ARE:

- To protect the airway.
- To arrange transport to the hospital.

IF the person is seriously injured, treat as a major facial fracture (see page 133).

- 1 Help a person who is not seriously injured to sit up with her head forward, to allow any blood, mucus, or saliva to drain away. Encourage her to spit out any loose teeth (see page 101).

IF she vomits, support her jaw and head, then gently clean out her mouth.

- 2 Give the person a soft pad to hold against her jaw and ask her to hold it firmly in place to support the jaw.



DO NOT bandage the pad in place.

- 3 Take or send the person to the hospital, keeping her jaw supported.

INJURIES TO THE UPPER LIMB

The term "upper limb" is used to describe the shoulder girdle (the collarbone and shoulder) and the

arm. People with injuries to the upper limb can often walk or be transported to the hospital seated.

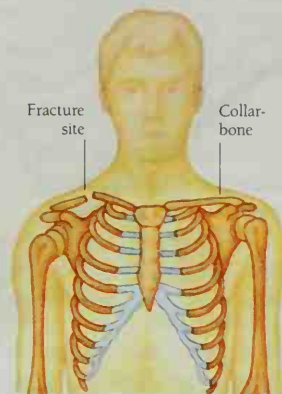
FRACTURED COLLARBONE

The collarbones (*clavicles*) form struts between the shoulder blades and the breastbone, to support the arms. It is rare for collarbones to be broken by a direct blow. They are usually broken by indirect force, transmitted from impact at the shoulder or a fall onto an outstretched hand.

Recognition

There may be:

- ◆ Pain and tenderness at the site of the injury, increased by movement.
- ◆ Attempts to relax muscles and relieve pain; the person may support the arm at the elbow, and incline the head to the injured side.



TREATMENT

YOUR AIMS ARE:

- To immobilize the injured upper limb.
- To arrange transport to the hospital.

1 Sit the person down. Place the arm on her injured side across her chest, and ask her to support it at the elbow.



3 Gently place some soft padding, such as a small towel or folded clothing, between the injured arm and the body to make the person more comfortable.

4 Secure the arm to the chest with a broad-fold bandage (*see page 229*) tied around the chest and over the sling.



2 Support the arm in an elevation sling (*see page 233*).

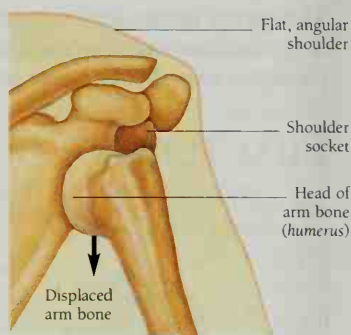
5 Take or send the person to the hospital, keeping her seated.

DISLOCATED SHOULDER

A wrenching force or a fall directly onto the shoulder or the outstretched arm may cause the head of the upper arm bone (*humerus*) to come out of the shoulder joint socket. This is a painful injury, and some people suffer repeated dislocations until a strengthening operation is carried out.

Recognition

- ◆ Pain, increased by movement.
- ◆ Reluctance to move because of the pain.
- ◆ The injured person often supports the arm, and inclines the head to the injured side.
- ◆ A flat, angular look to the shoulder.



TREATMENT

YOUR AIMS ARE:

- To support the injured limb.
- To arrange transport to the hospital.

1 Sit the person down. Gently place the affected arm across her chest at an angle that causes the least pain.

2 Place a triangular bandage between the affected limb and the chest, as for an arm sling (see page 232).

3 Insert soft padding between the arm and the chest on the affected side.



Pad between arm and body with folded fabric, triangular bandage, or cotton. Make sure you can see fingertips easily.



4 Finish tying the arm sling so that the arm and its padding are supported.

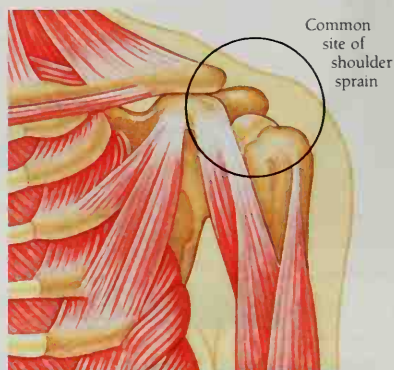
DO NOT attempt to replace the bone into its socket.

DO NOT let the injured person eat or drink, as an anesthetic may be necessary.

5 Take or send the person to the hospital, keeping her seated.

SHOULDER SPRAIN

A fall onto the point of the shoulder may sprain the ligaments that brace the collarbone at the shoulder. Other sprains affect the capsule and tendons around the shoulder joint; these sprains are common in older people. To treat, use ice and a sling for comfort.



FRACTURED UPPER ARM

The long bone of the upper arm may be fractured across its shaft by a direct blow, but it is much more common, especially in the elderly, for the neck of the arm bone (*humerus*) at the shoulder to break, usually in a fall.

Because this type of fracture is a stable injury (see page 129), the injured person may put up with the pain and walk around

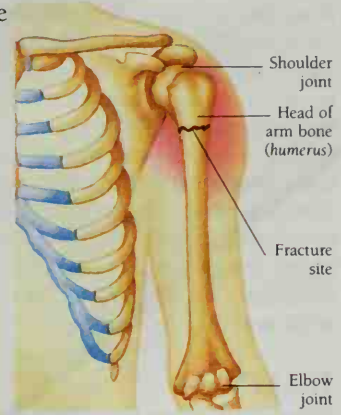
with an untreated fracture for some time without seeking medical advice.

Recognition

◆ Pain, increased by movement.

There may also be:

- ◆ Tenderness over the fracture site.
- ◆ Rapid swelling.
- ◆ Bruising, which may develop more slowly.



TREATMENT

YOUR AIMS ARE:

- To immobilize the arm.
- To arrange transport to the hospital.



1 Sit the person down. Gently place the injured arm across her chest in the position that is most comfortable. Ask her to support the arm, if possible.

2 Place the affected arm in an arm sling (see page 232), and place soft padding between the arm and the chest.



3 Secure the limb to the chest by tying a broad-fold bandage (see page 229) around the chest and over the sling.

4 Take or send the person to the hospital, keeping her seated.

INJURIES AROUND THE ELBOW

Fractures at the elbow are fairly common, often resulting from a fall onto the hand. A fracture or dislocation of the forearm bones is characterized by a stiff elbow that cannot be fully straightened.

Children often fracture the upper arm bone (*humerus*) just above the elbow. This is an unstable injury: the broken bone ends may move and damage nearby blood vessels and nerves, so it is vital to frequently check the pulse at the affected wrist and the circulation.

Recognition

- ◆ Pain, increased by movement.
- ◆ Tenderness over the fracture site.
- ◆ Possible swelling and bruising.
- ◆ Fixed elbow if the head of the radius is fractured.



TREATMENT

YOUR AIMS ARE:

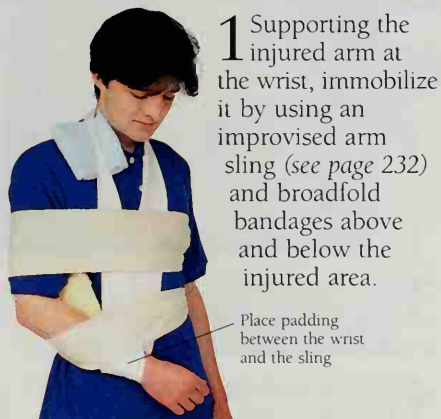
- To immobilize the arm without further injury to the joint.
- To arrange transport to the hospital.

FOR AN ELBOW THAT CAN BEND

Treat as for a fracture of the upper arm (see page 137). Check the affected wrist pulse (see page 77) every ten minutes.

FOR AN ELBOW THAT CANNOT BEND

DO NOT try to move the injured limb.
DO NOT attempt to bandage the injured limb if medical help is on its way.



1 Supporting the injured arm at the wrist, immobilize it by using an improvised arm sling (see page 232) and broadfold bandages above and below the injured area.

2 Using the pads of your fingers, check the pulse of the injured person's wrist (see page 77) every ten minutes. If the pulse becomes weak, make sure that you loosen the slings and or the bandages. Take or send the person to the hospital for further treatment.

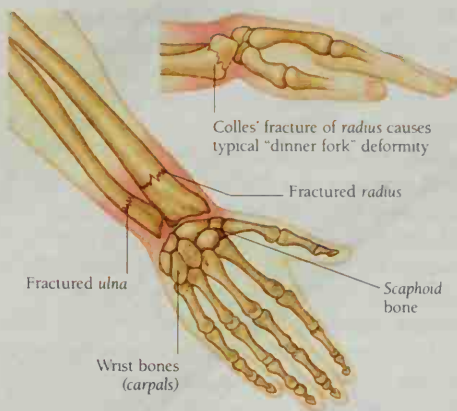
3 Circulation can also be checked at the fingertips. This is useful if the injured wrist is covered in a bandage.



INJURIES TO THE FOREARM AND WRIST

The bones of the forearm (the *radius* and *ulna*) may be fractured across their shafts by a heavy blow. As the bones have little fleshy covering, these fractures may be open, that is, associated with a wound.

The most common wrist fracture is a Colles' fracture (*see right*), usually suffered by older women who fall onto an outstretched hand. In a young adult, such a fall may break one of the small wrist bones. The complex wrist joint is rarely dislocated, but often sprained. It can be quite difficult to distinguish between a sprained and fractured wrist, especially if the *scaphoid* bone (*see right*) is injured.



TREATMENT

YOUR AIMS ARE:

- To immobilize the arm.
- To arrange transport to the hospital.

1 Sit the injured person down. Gently steady and support the injured forearm across his chest. If necessary, carefully expose and treat any wound (*see page 130*).



2 Place a triangular bandage between the chest and the injured arm, as for an arm sling (*see page 232*). Gently surround the forearm in soft padding. If available, a splint should also be used.

3 Tie the arm and its splint in an arm sling to support it (*see page 232*).



4 You may, if necessary, secure the limb to the chest, using a broad-fold bandage (*see page 229*). Tie it over the sling, positioning it close to the elbow.

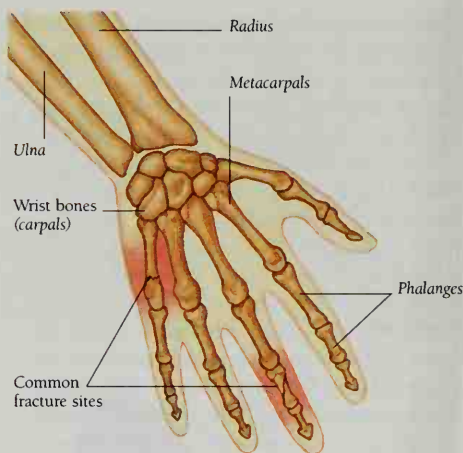
5 Take or send the injured person to the hospital, keeping him seated.

INJURIES TO THE HAND AND FINGERS

Any one of the many small bones and movable joints in the hand may be injured by direct or indirect force.

Minor fractures are usually caused by direct force. The most common injury often results from a misdirected punch and consists of a fracture of the knuckle between the little finger and the hand. Multiple fractures, affecting all of the bones in the hand, are usually caused by crushing injuries, and may produce severe bleeding and swelling.

Dislocations and sprains may affect any of the fingers. Falls onto the hand (for example, while skiing) are a common cause of dislocations of the thumb.

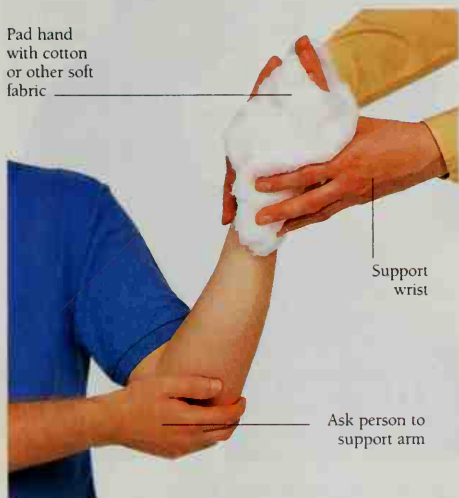


TREATMENT

YOUR AIMS ARE:

- To immobilize and elevate the hand.
- To arrange transport to the hospital.

Pad hand with cotton or other soft fabric



1 Remove any rings before the hand begins to swell and keep the hand raised to reduce swelling. Protect the injured hand by wrapping it in folds of soft padding.

2 Gently support the affected arm in an elevation sling (see page 233).

3 You may, if necessary, secure the arm to the chest by tying a broad-fold bandage (see page 229) around the chest and over the sling.

Use elevation sling to raise hand and to reduce swelling and bleeding



4 Take or send the person to the hospital, keeping him seated.

FRACTURES OF THE RIB CAGE

Ribs may be fractured by direct force to the chest, from a blow or a fall, or by indirect force produced in a crush injury. If the rib fracture is complicated by a penetrating wound, breathing may be seriously impaired.

Flail chest injuries

Multiple rib fractures can result in part of the chest wall moving contrary to normal chest movement: moving in when the victim breathes in, and out when he or she breathes out. This "paradoxical breathing" will cause severe respiratory difficulties.

TREATMENT

YOUR AIMS ARE:

- To support the chest wall.
- To arrange transport to the hospital.

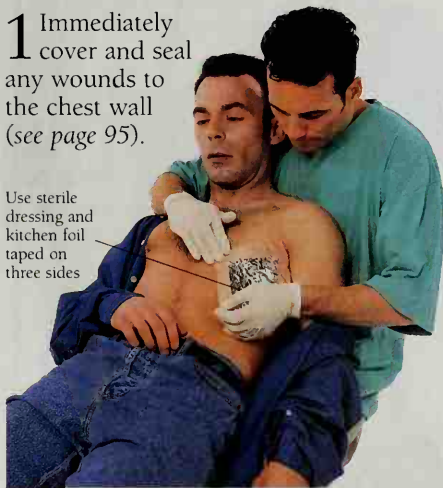
FOR A FRACTURED RIB

Support the limb on the injured side in an arm sling (see page 232). Take or send the victim to the hospital.

FOR OPEN OR MULTIPLE FRACTURES

1 Immediately cover and seal any wounds to the chest wall (see page 95).

Use sterile dressing and kitchen foil taped on three sides



Recognition

Depending on severity, there may be:

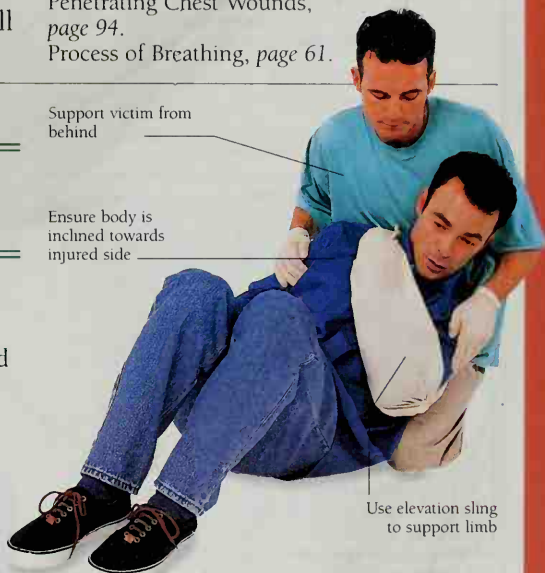
- ◆ Sharp pain at the site of the fracture.
- ◆ Pain on taking a deep breath.
- ◆ Shallow breathing.
- ◆ Paradoxical breathing.
- ◆ An open wound over the fracture, through which you might hear air being "sucked" into the chest cavity.
- ◆ Features of internal bleeding (see page 99) and shock (see page 78).

See also:

Penetrating Chest Wounds, page 94.
Process of Breathing, page 61.

Support victim from behind

Ensure body is inclined towards injured side



Use elevation sling to support limb

2 Place the victim in the most comfortable position, which may be half-sitting, with head, shoulders, and body turned toward the injured side. Support the limb on the injured side in an elevation sling (see page 233).

☎ DIAL 9-1-1 OR CALL EMS.

IF the victim becomes unconscious, or breathing becomes difficult or noisy, place him in the recovery position (see page 48), uninjured side uppermost.

BACK INJURIES

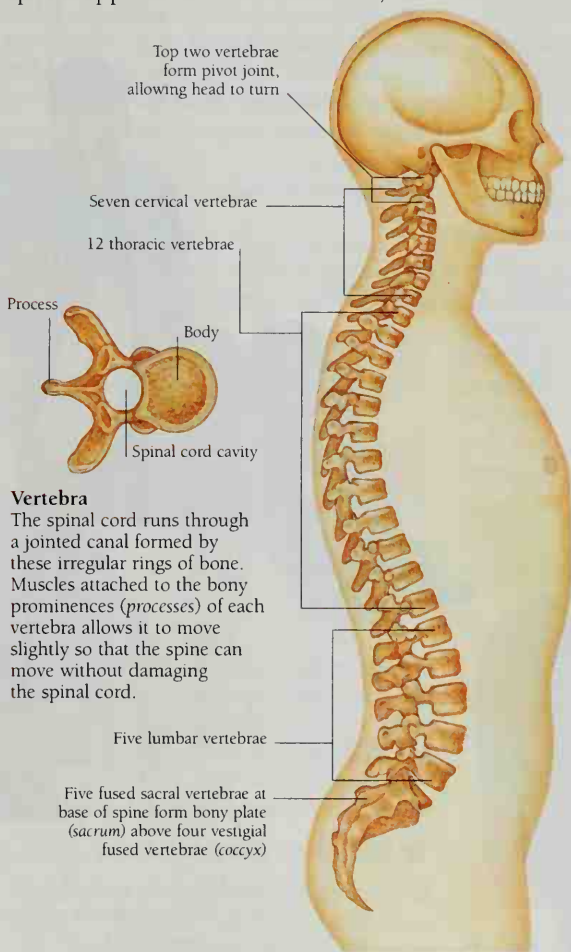
Injuries to the back include fractures, fracture-dislocations of the bones of the spine, a displaced intervertebral disk ("slipped disk"), and muscle and

ligament strains. The main danger, particularly with fracture-dislocations and disk injuries, is damage to the spinal cord or the nerves.

THE SPINE

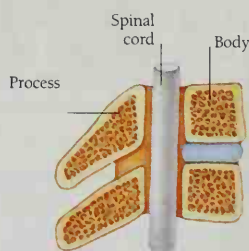
The spine, or backbone, is actually made up of a column of small bones, each of which is called a *vertebra*. The spine supports the trunk and head,

and surrounds and protects the spinal cord (see page 108). The spinal column is supported by many strong ligaments and the muscles of the trunk.



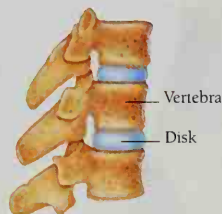
Vertebra

The spinal cord runs through a jointed canal formed by these irregular rings of bone. Muscles attached to the bony prominences (*processes*) of each vertebra allows it to move slightly so that the spine can move without damaging the spinal cord.



Spinal cord

Part of the nervous system (see page 108), this is composed of nerve fibers that pass messages from the brain to the organs and other parts of the body. At each junction between the first cervical and the fifth sacral vertebra, nerves issue from the spinal cord and supply different areas of the body.



Intervertebral disks

These thick pads of gristle separate almost all the vertebrae. They act as shock absorbers, cushioning the impact on the spine when, for example, landing on the feet.

SPINAL INJURY

The danger of any spinal injury is that the spinal cord may be affected. The spinal cord is delicate and, if damaged, loss of power or sensation can occur in parts of the body below the injured area. Temporary damage can be caused if the cord or nerve roots are pinched by displaced or dislocated disks or bone fragments; permanent damage results if the cord is partly or completely severed.

Dangers of spinal fracture

Although the spinal cord may be injured without any damage to the bones, spinal fracture vastly increases the risk. Such fractures can be caused by both direct and indirect force. The most vulnerable parts of the spine are the bones in the neck and in the lower back.

What causes spinal injury?

Always suspect spinal injury when unusual or abnormal forces have been exerted on the back or neck, and particularly if the victim complains of any disturbance of feeling or movement.

The history of the injury is the most important indicator. If the accident involved a violent forward bending, a backward bending, or a twisting of the spine, you must treat as for a fractured spine (see next page).

Recognition

When only the bones of the spinal column are damaged, there may be:

- ◆ Pain in the neck or the back at the level of the injury; this may be masked by other, more painful injuries.
- ◆ A step, irregularity, or twist in the normal curve of the spine.
- ◆ Tenderness on gently feeling the spine.

When the spinal cord is also damaged, there may be:

- ◆ Loss of control over limbs; movement may be weak or absent.
- ◆ Loss of sensation.
- ◆ Abnormal sensations, for example burning or tingling. The victim may say that limbs feel "stiff," "heavy," or "clumsy."
- ◆ Breathing difficulties.

SOME CAUSES OF SPINAL INJURY

- ◆ Falling from a height.
- ◆ Falling awkwardly while doing gymnastics or trampolining.
- ◆ Diving into a shallow pool and hitting the bottom.
- ◆ Being thrown from a horse or from a motorcycle.
- ◆ Contact sports injuries.
- ◆ Sudden deceleration in a motor vehicle (for example, in a head-on crash).
- ◆ A heavy object falling across the back.
- ◆ Injury to the head or the face.

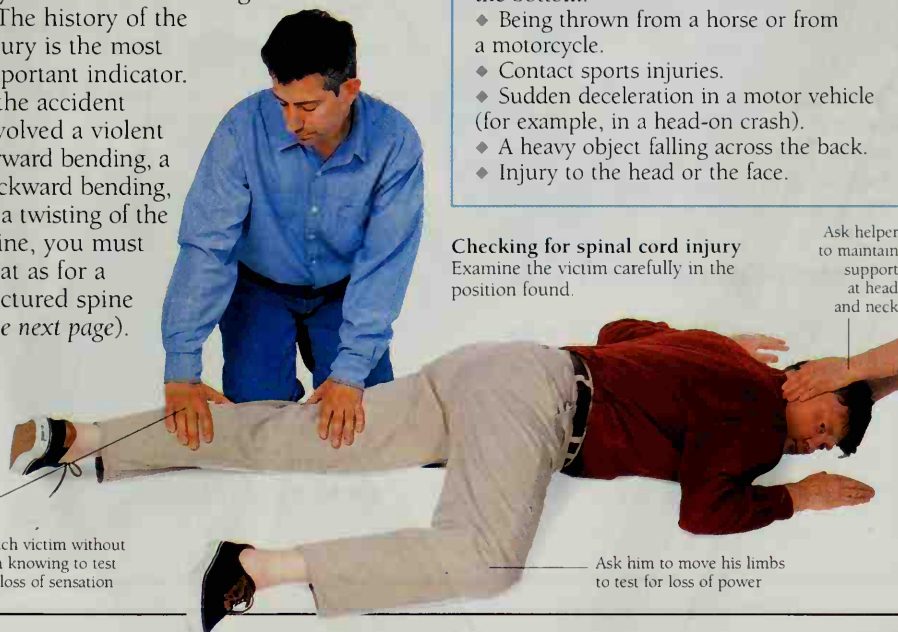
Checking for spinal cord injury

Examine the victim carefully in the position found.

Ask helper to maintain support at head and neck

Touch victim without him knowing to test for loss of sensation

Ask him to move his limbs to test for loss of power



TREATMENT FOR A CONSCIOUS VICTIM

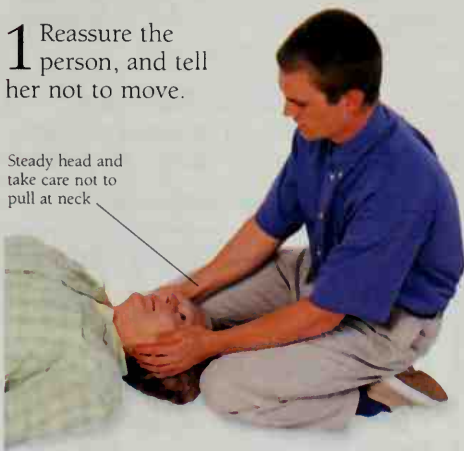
YOUR AIMS ARE:

- To prevent further injury.
- To arrange urgent transport to hospital.

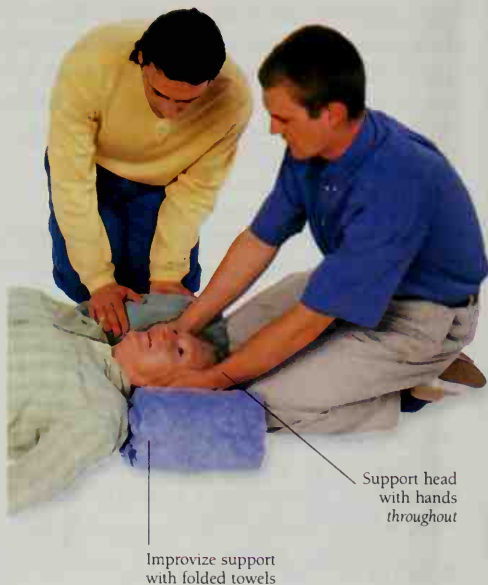
DO NOT move the injured person if you suspect a neck or spinal injury, unless he or she is in danger, or the airway is blocked, when you should use the log-roll technique (see pages 145–147).

1 Reassure the person, and tell her not to move.

Steady head and take care not to pull at neck



2 Steady and support her head in the neutral position (see page 147) by placing your hands over her ears. Maintain this support throughout.



IF you suspect neck injury, get a helper to place rolled-up blankets or articles of clothing on either side of the person's neck and shoulders.

☎ DIAL 9-1-1 OR CALL EMS.

Maintain support of the head and the neck with your hands until the ambulance arrives.

WHEN IN DOUBT, WAIT FOR HELP

Whenever possible, **DO NOT** move the injured person until the ambulance arrives with specialized equipment and medical expertise. Ambulance personnel are professionally trained and well equipped to manage spinal injuries.

They will use specially designed collars, spine immobilizers, back boards and stretchers, supplemented with head blocks, tape and restraining belts to immobilize and allow safe transport of the spinal injury victim.

TREATMENT FOR AN UNCONSCIOUS VICTIM

YOUR AIMS ARE:

- To resuscitate the victim if necessary.
- To maintain an open airway.
- To prevent further damage to the spine or spinal cord.
- To arrange urgent transport to hospital.

DO NOT move the person unless it is necessary to resuscitate or to protect the airway. Movement risks worsening a spinal injury. Check the victim's breathing and pulse.

IF BREATHING AND PULSE ARE ABSENT

1 DIAL 9-1-1 OR CALL EMS.

Open and, if needed, clear the airway (see page 47). Lift the chin but keep the head and neck in the neutral position (see page 147).

2 Recheck the person's breathing and pulse. If they have not returned, start rescue breathing (see pages 50–51) and chest compressions (see page 53); continue until help arrives. If moving the person is necessary, use the log-roll technique (see below).

LOG-ROLL TECHNIQUE

If you have to turn the person with a suspected spinal fracture, you should keep her head, trunk, and toes in a straight line at all times during the maneuver. While you maintain support at the neck, ask helpers to gently straighten the victim's limbs, and “log-roll” her over onto her back. Ideally, you need three helpers to carry out this maneuver. This technique can also be used to roll the victim onto a stretcher.

Support head and neck with your hands at all times

The victim's whole body should be turned as a unit

There should always be a helper at the feet

Each helper should have a good firm grip on the victim



STABILIZING A PERSON WITH A SPINAL INJURY

People with suspected spinal injuries should not be moved unless absolutely necessary, such as to protect them from danger or to maintain the airway. On occasion, a spinal injury may occur in the wilderness or a remote area where professional rescuers may be delayed for many hours. It may then be necessary to

protect the injured person from wet or cold conditions with a blanket or ground sheet until help arrives. *If it is absolutely necessary* to move the injured, be sure to support the neck and keep the trunk aligned at all times during the maneuver shown below, so that the spinal cord is protected.

METHOD

DIAL 9-1-1 OR CALL EMS.

1 Steady and support the victim in the position found. Hold the head in the neutral position by placing your hands over his ears. Maintain this support until help arrives.



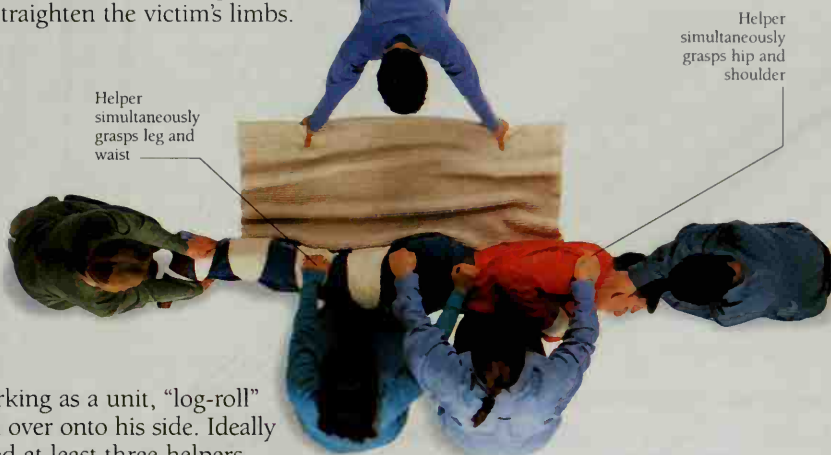
2 Tie the victim's wrists and legs together so that you can roll him as a unit. Tie the wrists and pad between the legs with a blanket. Tie the knots on the blanket between the legs. Use a figure-eight at the ankles and feet.



3 Get a warm blanket ready and prepare to turn the victim by getting helpers into position. Give plenty of support at the spine; support the head continuously. Everyone works together with the person at the head directing movement.



4 Keep the head, trunk, and toes in a straight line at all times during the maneuver. While you maintain support at the neck, ask helpers to gently straighten the victim's limbs.



5 Working as a unit, "log-roll" him over onto his side. Ideally you need at least three helpers.

6 Wrap the victim in a blanket to keep him warm while awaiting medical help.



IF you have to send your helper to summon aid, place rolled blankets, coats, or similar articles on either side of the victim to keep him in the neutral position. This will keep him steady until help arrives.

THE NEUTRAL HEAD POSITION

When moving someone with a suspected spinal injury, always make sure that the head, neck, and spine are aligned. When moving the head, grip it firmly over the ears and move it slowly into position. To ensure that the person is in the correct position, check that the nose is in line with the navel.

BACK PAIN

The lower back and neck are the most common sites of muscle or ligament sprain. Damage to the disks between the vertebrae may irritate or pinch the spinal cord or adjoining nerve roots.

How back pain is caused

Prolonged bending, lifting heavy weights, strenuous exercise, or an awkward fall can all lead to back and neck strain. Other causes of backache include kidney disease, pregnancy, and menstruation. A common cause of neck sprain is the "whiplash" effect produced in a car accident.

Dangerous complications

Hospital treatment is needed if back pain is accompanied by muscle spasms, fever, headaches, vomiting, nausea, impaired consciousness, incontinence, or loss of sensation or movement.

Recognition

There may be:

- ◆ Dull or severe pain in the back or neck, which is usually increased by movement.
- ◆ Pain traveling down any of the limbs, possibly together with tingling and numbness.
- ◆ Spasm of the muscles, causing the neck or back to be held rigid or bent.
- ◆ Tenderness in the muscles.



TREATMENT

YOUR AIMS ARE:

- To relieve pain.
- To seek medical aid if necessary.

FOR MINOR BACK PAIN



FOR SEVERE BACK PAIN

Help the person lie down and make him as comfortable as possible (see below). Call a doctor.

☎ DIAL 9-1-1 OR CALL EMS if there are complications (see above), or if you are at all worried about the person's condition.

1 Help the person lie down in the most comfortable position, either on the ground or on a firm mattress.

2 Advise him to rest until the pain eases, and to see his doctor if symptoms persist.

FRACTURED PELVIS

Injuries to the pelvis are usually caused by indirect force, such as in a car crash or by crushing. The impact of a car dashboard on a knee can force the head of the thighbone through the hip socket.

Pelvic injuries may be complicated by injury to internal tissues and organs, such as the bladder and urinary passages, which the pelvis protects. Because of the bulk of body tissue around the pelvis, internal bleeding associated with the fracture may be severe, and shock often develops.

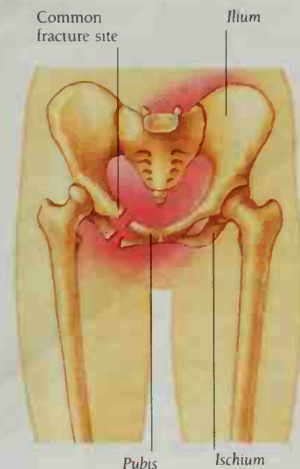
Recognition

There may be:

- ◆ Inability to walk or even stand, although the legs appear uninjured.
- ◆ Pain and tenderness in the region of the hip, groin, or back, increased with movement.
- ◆ Blood at the urinary orifice, especially in a male victim. The victim may not be able to pass urine or may find this painful.
- ◆ Signs of shock and internal bleeding.

See also:

Internal Bleeding, page 99.
Shock, page 78.



The pelvic girdle

This consists of two hipbones formed by the fusions of three paired bones, the ischium, the ilium, and the pubis.

TREATMENT

YOUR AIM IS:

- To arrange urgent transport to the hospital.

Keep head low to minimize shock

Tie broad-fold bandage, gently but firmly, at knees

Tie narrow-fold bandage in figure-eight at feet



1 Help the victim lie on his back either with his legs straight or, if it is more comfortable, help him bend his knees slightly and support them.

2 Immobilize his legs by bandaging them together, placing padding between the bony points.

3 **DIAL 9-1-1 OR CALL EMS** and treat for shock (see page 78).

DO NOT bandage the legs together if this causes intolerable pain.

INJURIES TO THE LOWER LIMB

Injuries that may affect the lower limb, from the hip joint to the toes, include fractures, dislocations,

sprains, and strains. It is important that victims with lower limb injuries do not put weight on the injured leg.

INJURIES TO THE HIP AND THIGH

It takes considerable force (such as in road accidents or falls from heights) to fracture the shaft of the thigh bone. This is a serious injury because in many cases, a large volume of blood is lost into the tissues, which may cause shock to develop.

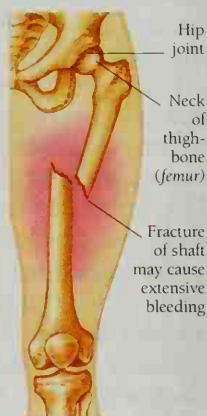
Fractures of the neck of the thigh bone (femur) at the hip joint are common in the elderly, particularly in elderly women, whose bones become more porous and brittle as they age. This can be a stable injury (see page 129); the victim may be able to walk around for some time before the fracture is discovered. The hip may also, more rarely, be dislocated.

Recognition

There may be:

- ◆ Pain at the site of the injury.
- ◆ Inability to walk.
- ◆ Signs of shock.
- ◆ Shortening of the thigh, as powerful muscles pull broken bone ends together.
- ◆ A turning outwards of the knee and foot.

See also:
Shock, page 78.



TREATMENT

YOUR AIMS ARE:

- To immobilize the lower limb.
- To arrange transport to the hospital.

3 **DIAL 9-1-1 OR CALL EMS.**

Support the leg until the ambulance arrives.

Pull ankle firmly and steadily away from knee in line of limb

Support injured limb while traction is applied at ankle

1 Lay the injured person down gently.
2 Ask a helper to steady and support the injured limb.

2 Gently straighten the lower leg and apply traction (see page 131) at the ankle, if appropriate.

DO NOT give the injured anything to eat or drink.

4 Take any steps possible to treat the person for shock; insulate him from the cold, but do not raise his legs.

IF the ambulance is delayed, immobilize the limb by securing or splinting it to the uninjured limb.

- ◆ Gently bring the person's uninjured limb alongside the injured one.
- ◆ Maintaining traction throughout at the ankle, gently slide two bandages under the knees. Ease them into place above and below the fracture by sliding them backward or forward. Position more bandages under the knees and ankles.
- ◆ Insert padding between thighs, knees, and ankles, to stop the bandages from displacing the broken bone once tied.

◆ Tie the bandages around his ankles and knees. Then tie the bandages above and below the fracture site.

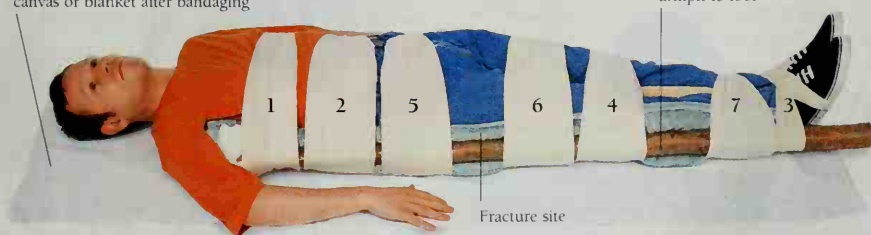
◆ Release traction only when all bandaging knots are tied.



TRANSPORTING AN INJURED PERSON OVER DISTANCE

Log-roll injured onto carrying canvas or blanket after bandaging

Splint from armpit to foot



If you have to transport an injured person on a stretcher to reach help (for example, across a field), sturdier support for the leg will be needed. If you have been trained to do it, use a special malleable splint.

Alternatively, place a leg splint, such as a fence post, reaching from the armpit to the foot, against the injured side. Pad between the legs and between the splint and body.

Secure the splint to the pelvis with broad-fold bandages at the chest (1), pelvis (2), ankles (3), knees (4), above and below the fracture site (5 and 6) and at one extra point for support (7). *Do not* bandage over the fracture. Move the injured onto the stretcher using the log-roll technique (see page 145). While carrying the stretcher, raise the feet to reduce swelling and shock.

INJURIES TO THE KNEE JOINT

The knee is the strong hinge joint between the thighbone (*femur*) and shinbone (*tibia*). It is capable of bending, straightening, and, in the bent position, slight rotation. The knee joint is supported by strong muscles and ligaments, and protected in front by a disc of bone, the kneecap (*patella*). Any of these structures may be damaged by direct blows, violent twists, or strains.

Recognition

There may be:

- ◆ A recent twist or blow to the knee.
- ◆ Pain, spreading from the injury to become deep-seated in the joint.
- ◆ If the bent knee has "locked," acute pain on attempting to straighten the leg.
- ◆ Rapid swelling at the knee joint.



TREATMENT

YOUR AIMS ARE:

- To protect the knee in the most comfortable position.
- To arrange transport to the hospital.

1 Help the person lie down. Place soft padding, such as a blanket, under her injured knee to support it in the most comfortable position.

Keep your body clear of injury as you work

Use roller bandage to hold padding in place

Support person's knee with pillow, folded blanket, or coat

DO NOT attempt to straighten the knee forcibly. Displaced cartilage or internal bleeding may make the joint impossible to straighten safely.

DO NOT give the injured anything to eat or drink; she may need an anesthetic.

DO NOT allow the injured to walk.

2 Wrap soft padding around the joint, and bandage it carefully in place.

3 Take or send the injured to the hospital.

INJURIES TO THE LOWER LEG

The sturdy shinbone (*tibia*) of the lower leg will usually be broken only by a heavy blow (for example, from the bumper of a moving vehicle).

The thinner splint bone (*fibula*) can be broken by the type of twisting injury that sprains the ankle. If the load-bearing shinbone remains intact, the injured may be able to walk, and may be unaware that a fracture has occurred.

Recognition

- ◆ Localized pain.

There may also be:

- ◆ A recent blow or wrench of the foot.
- ◆ An open wound.
- ◆ Inability to walk.



TREATMENT

YOUR AIMS ARE:

- To immobilize the leg.
- To arrange transport to the hospital.

1 Help the injured lie down, and carefully steady and support the injured leg. If necessary, gently expose and treat any wound (see page 130).

Support leg at knee and ankle



2 Straighten the leg using traction (see page 131); pull in the line of the shin.

3 **DIAL 9-1-1 OR CALL EMS.**

Support the leg with your hands until the ambulance arrives.

IF the ambulance is delayed, splint the injured limb to the uninjured one.

- ◆ Bring the uninjured limb to the injured one.

Use broad-fold bandages

Pad with towels or clothing

Fracture site



- ◆ Gently slide bandages under the knees and ankles. Slide them to the knees and ankles, and above and below the fracture; avoid the fracture if it is close to a joint.
- ◆ Insert padding between the knees and ankles and between the calves.
- ◆ Tie the bandages firmly around ankles and knees, then above and below the fracture. Knot on the uninjured side.

TRANSPORTING THE INJURED

If you are transporting the injured on a stretcher, place extra padding (such as blankets) on either side of the legs, from the upper thigh to the foot. Secure with broad-fold bandages at the thigh and knee, and above and below the fracture.

IF the ankle is broken, bandage above the ankle and around the toes, rather than in a figure-eight.

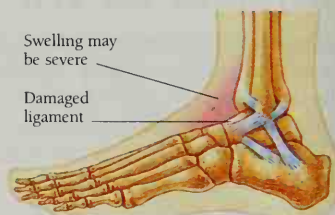


SPRAINED ANKLE

If the ankle is broken, treat it as a fracture of the lower leg (*see page 153*); a sprain (usually caused by a wrench) can be treated by the RICE procedure (*see page 132*).

Recognition

- ◆ Pain, increased either by movement or by putting weight on the foot.
- ◆ Swelling.



TREATMENT

YOUR AIMS ARE:

- To relieve pain and swelling.
- To seek medical aid if necessary.

IF you suspect a broken bone, secure and support it (*see page 131*), and take or send the injured to the hospital.

1 Rest, steady, and support the ankle in the most comfortable position.

2 Apply an ice pack or a cold compress (*see page 221*) to a recent injury to reduce swelling.

3 Wrap the ankle in a thick layer of padding and bandage firmly.

4 Raise and support the injured limb to reduce swelling.

5 Advise the injured to rest the ankle, and to see a doctor if pain persists.

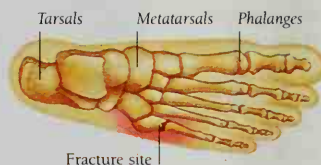
FRACTURES OF THE FOOT

Fractures affecting the many small bones of the foot are usually caused by crushing injuries. These types of fractures are best treated at the hospital.

Recognition

There may be:

- ◆ Difficulty in walking.
- ◆ Stiffness of movement.
- ◆ Bruising and swelling.



TREATMENT

YOUR AIMS ARE:

- To minimize swelling.
- To arrange transport to the hospital.

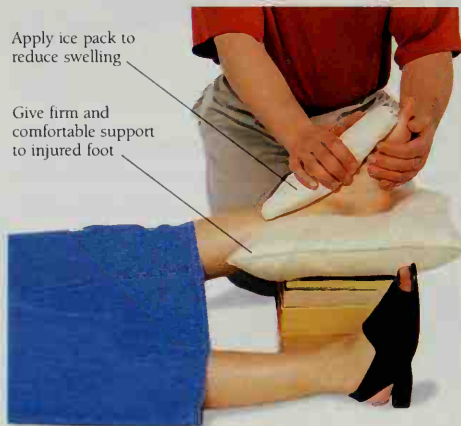
1 Quickly raise and support the foot to reduce blood flow to the foot and so minimize swelling.

2 Apply an ice pack or cold compress (*see page 221*).

3 Arrange to take or send the injured person to the hospital. Try to ensure that the foot remains elevated during transportation.

Apply ice pack to reduce swelling

Give firm and comfortable support to injured foot



BURNS AND SCALDS

10

Burns result from dry heat, extreme cold, corrosive substances, friction, or radiation, including the sun's rays; scalds are caused by wet heat from hot liquids and vapors.

Burns and scalds may be associated with conditions that pose a greater threat to life or there may be other serious injuries caused, for example, by an explosion or a jump from a burning building. In addition to treating the burns, the victim should be thoroughly examined.

Dealing with burns

The approach to an accident resulting in burns is frequently complicated by the presence of fire, an explosion, electricity, smoke, toxic fumes, or other hazards (*see Action at an Emergency, pages 15–28*). Burns can be very distressing, and both you and the victim may be upset by the smell of singed hair and burned flesh.

FIRST-AID PRIORITIES

- ◆ Establish your own safety before attempting to treat the burn victim.
- ◆ Deal with any airway problems.
- ◆ Stop the burning, by rapid cooling, to prevent further tissue damage, reduce swelling, minimize shock, and alleviate pain.
- ◆ Cover the injury to protect it from infection.
- ◆ Check for other injuries.
- ◆ Except in the case of very minor burns, assess the burns and obtain appropriate medical aid.

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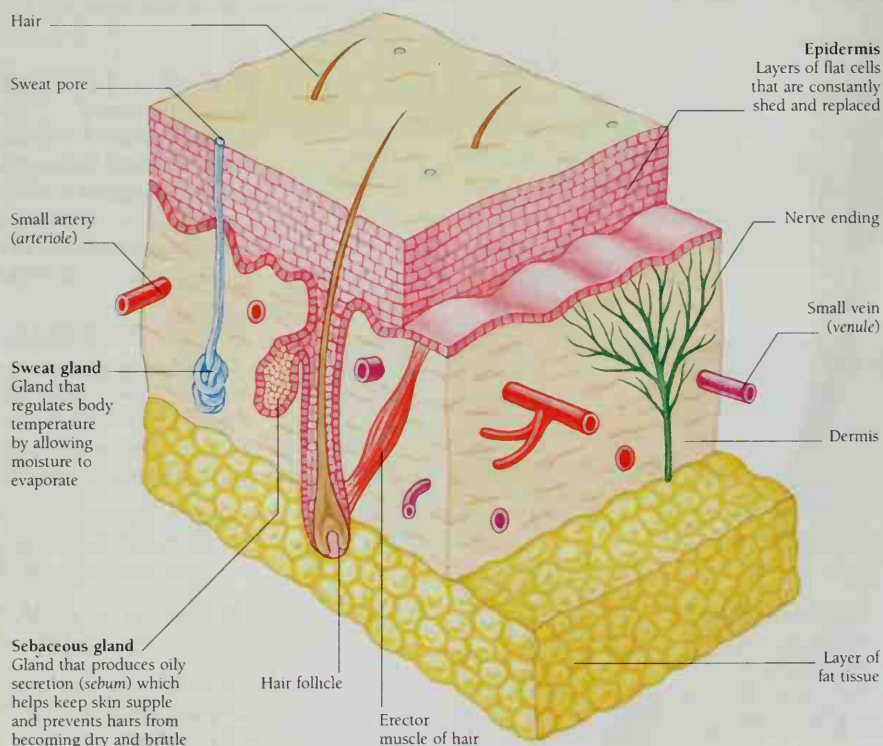
THE SKIN

One of the largest organs of the body, the skin is made up of two layers of tissue, the outer *epidermis* and the inner *dermis*, and lies on a layer of *subcutaneous* fat.

The epidermis contains a fatty substance that makes the skin waterproof. The dermis contains blood vessels, nerves, muscles, oil (*sebaceous*) glands, sweat glands, and hair roots (*follicles*). The sensory nerves within the dermis allow the body's surface area to be sensitive to heat, cold, pain, and the slightest touch. In addition to protecting the body from injury, bacterial and viral

infections, and minor burns, the skin's key function is to maintain a constant body temperature. It does this by varying the blood flow into capillary vessels beneath the skin surface and by producing *perspiration*, which evaporates and thereby cools the body.

The blood capillaries dilate and perspiration increases when the body is too warm. If the body needs to conserve heat, the blood vessels constrict and small muscles attached to the hair follicles contract, pulling the skin into "goose-bumps." The body also creates heat by shivering.



ASSESSING A BURN

Before treating a burn, it is important to consider the extent and the degree of the burn, its cause, and whether the airway is affected.

The extent of the burn will tell you whether shock is likely to develop because of excessive loss of tissue fluid (*serum*). Burns destroy the skin, the body's natural barrier against airborne bacteria, and therefore carry a serious risk of infection: the deeper the burn, the higher the risk (*see next page*).

Once you are able to establish the cause of the burn, you can decide on the treatment. If the airway has been injured, the victim may experience breathing difficulties, which will require urgent attention (*see page 162*).

How the skin reacts to a burn

When the skin is burned, the small blood vessels within the skin leak fluid. This fluid either gathers in tissue spaces to form blisters or it leaks through the skin surface. In a burn over a large surface area, this loss of fluid can lead to a marked drop in the blood volume and loss of blood proteins, a condition that may result in shock.

If the burn is on a limb, the fluid may accumulate in the tissues, causing swelling and pain. This is particularly dangerous if the limb is being constricted, for example by clothing or footwear.

See also:

Burns to the Airway, *page 162*.

Shock, *page 78*.

HOW BURNS ARE CAUSED

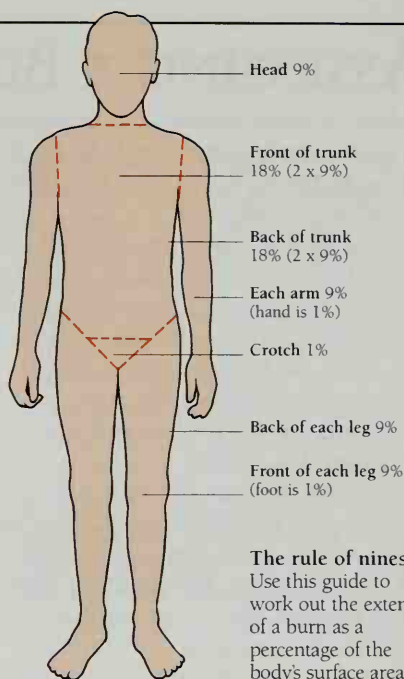
Type of burn	Causes
Dry burn	• Flames • Contact with hot objects, for example domestic appliances or cigarettes • Friction, for example rope burns
Scald	• Steam • Hot liquids, such as tea and coffee, or hot fat
Electrical burn	• Low-voltage current, as used by domestic appliances • High-voltage currents, as carried in transmission cables • Lightning strikes
Cold injury	• Frostbite • Contact with freezing metals • Contact with freezing vapors, such as liquid oxygen or liquid nitrogen
Chemical burn	• Industrial chemicals, including inhaled fumes and corrosive gases • Domestic chemicals and agents, such as paint stripper, caustic soda, weed killers, bleach, oven cleaner, or any other strong acid or alkali
Radiation burn	• Sunburn • Overexposure to ultraviolet lamp ("sunlamp") • Exposure to radioactive source, such as an X ray

EXTENT OF BURNS

It is vital to assess the extent of the area affected by a burn, because the greater the surface area, the greater the fluid loss and risk of shock. By using a simple formula, the "rule of nines," that divides the body into areas of about nine percent, you can calculate the extent and decide what medical aid is needed. If in doubt, call a doctor. For an adult:

- ◆ any second-degree burn of one percent or more must be seen by a doctor;
- ◆ a second-degree burn of over nine percent will cause shock to develop and the victim will need hospital treatment;
- ◆ any third-degree burn requires hospital treatment. A child with any second- or third-degree burns needs medical aid.

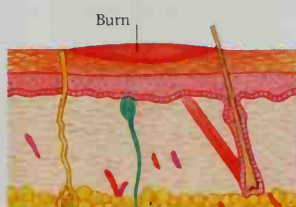
If 60% of the skin surface (40% in the very young or old) is burned, kidney failure is likely to occur up to six weeks after the burn is sustained.



DEGREE OF BURNS

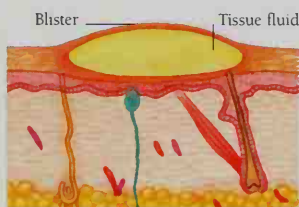
There are three types of burn injury: first-degree, second-degree, and third-degree. A victim may suffer one or more depths of burn in an incident. In very deep

burns, pain sensation is usually lost, which may mislead both you and the victim about the true severity of the injury.



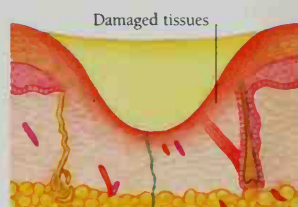
First-degree burn

This involves only the outermost layer of skin and is characterized by redness, swelling, and tenderness. It usually heals well if first aid is given promptly, and should not require medical attention unless it is extensive.



Second-degree burn

Any one percent burn affecting layers of the epidermis, giving rise to rawness and blisters, needs medical treatment. Such burns can heal well, but if they affect very large areas (ie, over 60%) of the body, they can be fatal.



Third-degree burn

With this type of burn, all the layers of the skin are burned and there will be some damage to nerves, fat tissue, and muscles. The skin may look waxy, pale, or charred. Urgent medical attention is always essential for these burns.

MINOR BURNS AND SCALDS

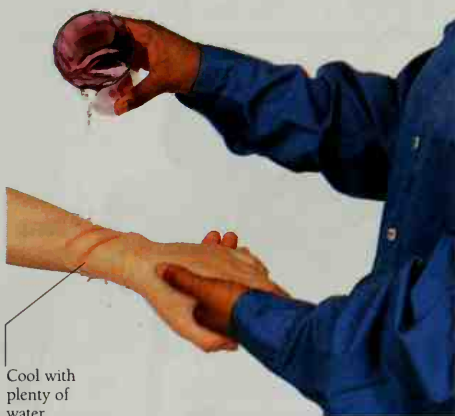
Small, first-degree burns are often caused by domestic accidents. Most can be treated by a First Aider and

will heal naturally. If you are in any doubt as to the severity of the injury, seek medical advice.

TREATMENT

YOUR AIMS ARE:

- To stop the burning.
- To relieve pain and swelling.
- To minimize the risk of infection.



Cool with plenty of water

1 Flood the injured part with cool water for at least ten minutes to stop the burning and relieve the pain. If water is not available, any cool, harmless liquid, such as milk or canned drinks, will do.

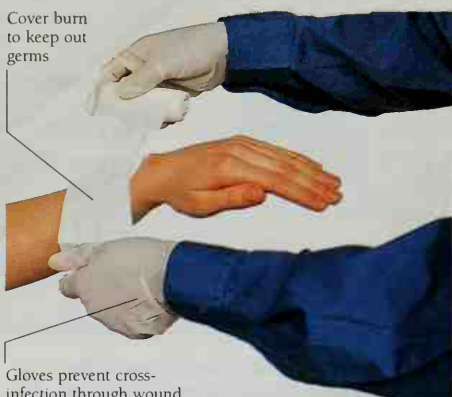
2 Gently remove any jewelry, watches, belts, or constricting clothing from the injured area before it begins to swell.

DO NOT break blisters or otherwise interfere with the injured area.

DO NOT apply adhesive dressings or tape to the skin; the burn may be more extensive than it first appears.

DO NOT apply lotions, ointments, butter, or fats to the injury; they can increase the damage to tissues and risk of infection.

3 Cover the area with a sterile dressing, or any clean, nonfluffy material, and bandage loosely in place. A plastic bag (see page 161) makes a good temporary covering.



Cover burn to keep out germs

Gloves prevent cross-infection through wound

BLISTERS

Thin "bubbles," known as blisters, form on skin that has been damaged by heat or friction. They are caused by tissue fluid (serum) leaking into the burned area below the skin's surface. During healing, new skin forms at the base of the blister; the serum is reabsorbed and the outer layer of dead skin will eventually peel off.

What you should do

Never break a blister because you may introduce infection into the wound. A blister usually needs no treatment. However, if it breaks, or is likely to be damaged, cover the injured area with a dry, nonadhesive dressing that extends well beyond the edges of the blister. Leave in place until the blister subsides.

SEVERE BURNS AND SCALDS

Great care must be taken when treating burns that are deep or extend over a large area. The longer the burning continues, the more severe the injury will be. If the victim has been burned in a fire, it should be assumed that smoke or hot air has also affected the respiratory system.

The two essential priorities for you, therefore, are to initiate rapid cooling of the burn, and to check the victim's

breathing. Follow the ABC of resuscitation if necessary (*see pages 44–58*). A person with a severe burn or scald injury will almost certainly be affected by shock and may require resuscitation.

See also:

Burns to the Airway, *page 162*.

Fires, *page 22*.

Resuscitation, *pages 44–58*.

Shock, *page 78*.

TREATMENT

YOUR AIMS ARE:

- To stop the burning and relieve pain.
- To maintain an open airway.
- To treat associated injuries.
- To minimize the risk of infection.
- To arrange transport to the hospital.
- To gather relevant information for the emergency services.

1 Lay the victim down. Protect the burned area from contact with the ground, if possible.

2 Douse the burn with plenty of cool water. Thorough cooling may take at least ten minutes, but must not delay transport to the hospital.

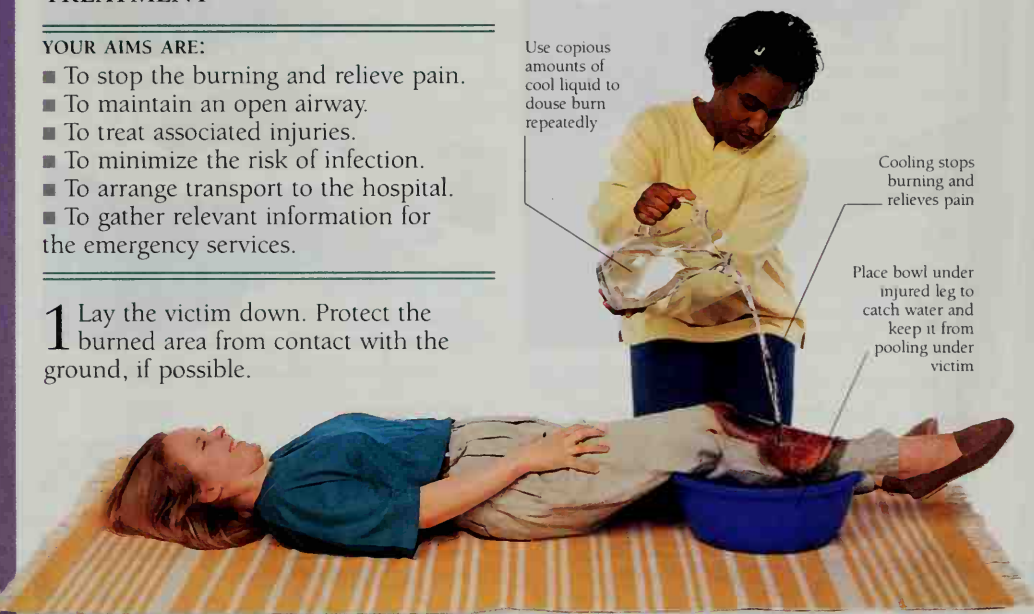
3 While burn is cooling, watch for signs of difficulty breathing. Be ready to resuscitate if necessary (*see pages 44–58*).

☎ DIAL 9-1-1 OR CALL EMS.

Use copious amounts of cool liquid to douse burn repeatedly

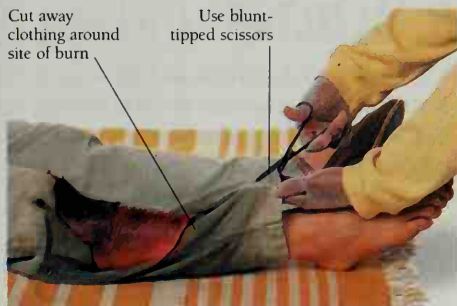
Cooling stops burning and relieves pain

Place bowl under injured leg to catch water and keep it from pooling under victim



DO NOT overcool the victim; this treatment carries with it the risk of lowering the body temperature to a dangerous level (*hypothermia*) if the burns cover a large part of the body.

DO NOT remove anything sticking to the burn; you may cause further damage and introduce infection into the wound.



4 Gently remove any rings, watches, belts, shoes, or smoldering clothing from the injured area before it begins to swell. Carefully remove burned clothing, unless it is sticking to the burn.

DO NOT touch or otherwise interfere with the injured area.

DO NOT burst any blisters.

DO NOT apply lotions, ointment, butter, fat, or adhesive tape to the injury.



5 Cover the injury with a sterile dressing or some other suitable material (*see box, below*) to protect it from bacteria and infection.

IF the victim has a burn to the face, it does not need to be covered. Keep cooling a facial injury with water to relieve the pain until help arrives.

6 Gather and *record* details of the victim's injuries, circumstances, and potential hazards such as gas.

7 While waiting for help, reassure the victim and treat for shock. Monitor and *record* her breathing and pulse rates (*see page 40*), and be prepared to resuscitate if necessary (*see pages 44–58*).

DRESSING A BURN

Burns and scalds must be covered to protect them from infection by airborne bacteria, although the dressing does not need to be secured unless it is on an awkward part of the body. Use a sterile dressing if possible, or improvise a dressing with clean, nonfluffy material, such as:

- ◆ a portion of a clean sheet or pillowcase;
- ◆ a clean plastic bag for a burned hand or foot. Secure it with a bandage or adhesive tape over the plastic, not the skin.

◆ a triangular bandage, folded to the appropriate size.

Clean plastic bag protects burn on hand



SPECIAL TYPES OF BURNS

Many burns are caused not by direct contact with a naked flame, but by scorching air or heat produced within the body tissues by, for example, electricity. The damage caused is the same as that in thermal burns, and first aid follows the same principles. With accidents involving high-voltage

electricity or harmful chemicals, remember that your own safety comes first. Do not endanger yourself or others by treating someone in hazardous circumstances, however urgent the victim's needs appear.

See also:

Action at an Emergency, pages 15–28.

BURNS TO THE AIRWAY

Burns to the face and within the mouth or throat are very dangerous, as the air passages rapidly become inflamed and swollen. Usually, signs of burning will be evident, but you should always suspect burns to the airway if the injury has been sustained in a confined space, as the victim may have inhaled hot air or gases.

There is no specific first-aid treatment for an extreme case; the swelling will rapidly block the airway, and there is a serious risk of suffocation. Immediate and specialized medical aid is required.

Recognition

There may be:

- ◆ Soot around the nose or mouth.
- ◆ Singeing of the nasal hairs.
- ◆ Redness, swelling, or actual burning of the tongue.
- ◆ Damaged skin around the mouth.
- ◆ Hoarseness of the voice.
- ◆ Breathing difficulties.

See also:

Shock, page 78.

TREATMENT

YOUR AIMS ARE:

- To obtain specialized medical aid as quickly as possible.
- To maintain an open airway.

1 DIAL 9-1-1 OR CALL EMS.

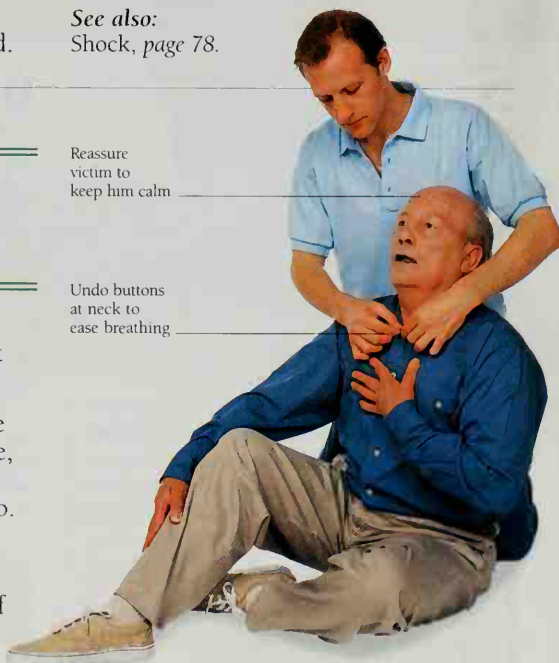
Tell the dispatcher that you suspect burns to the airway.

2 Take any steps possible to improve the victim's air supply; for example, loosening clothing around his neck. Give oxygen if you are trained to do so.

IF the victim becomes unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). Place him in the recovery position (see page 48).

Reassure
victim to
keep him calm

Undo buttons
at neck to
ease breathing



ELECTRICAL BURNS

Burns may occur when electricity passes through the body. Much of the visible damage occurs at the points of entry and exit of the current. However, there may also be a track of internal damage. The position and direction of entry and exit wounds will alert you to the likely extent of hidden injury, and to the degree of shock that may ensue.

Dangers of electrical burns

Burns may be caused by a lightning strike or by low or high-voltage current. An electric shock can cause cardiac arrest. If the victim is unconscious, your immediate priority, once you are sure it is safe, is the ABC of resuscitation (see pages 44–58).

Recognition

There may be:

- ◆ Unconsciousness.
- ◆ Third-degree burns, with swelling, scorching, and charring, at both the point of entry and exit.
- ◆ Signs of shock.
- ◆ A brown, coppery residue on the skin, if the person has been a victim of “arcing” high-voltage electricity. (Do not mistake this for injury.)

See also:

Cardiac Arrest, page 84.
Electrical Injuries, page 24.
Severe Burns and Scalds, page 160.
Shock, page 78.
Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To treat the burns and shock.
- To arrange transport of the victim to the hospital.

1 Make sure that contact with the electrical source is broken (see page 25).

IF the victim is unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58).

2 Flood the sites of injury with plenty of cool water to cool the burns (see page 160), and cut away any burned clothing if necessary.

3 Place a sterile dressing, a clean, folded triangular bandage, or some other clean, nonfluffy material over the burns to protect them against any airborne infection.

☎ **DIAL 9-1-1 OR CALL EMS.**

4 Reassure the victim and treat for shock (see page 78).



DO NOT approach a victim of high-voltage electricity until you are officially informed that the current has been switched off and isolated.

CHEMICAL BURNS

Certain chemicals may irritate, harm, or be absorbed through the skin, causing widespread and sometimes fatal damage. Unlike thermal burns, the signs develop slowly, but the first aid is the same.

Most strong corrosives are found in industry, although chemical burns do occur in the home, especially from dishwasher products (the most frequent cause of alkali burns in children), oven cleaners, and paint stripper.

Chemical burns are always serious and may require urgent hospital treatment. If possible, note the name or brand name of the substance. Ensure your own safety: some chemicals give off deadly fumes.

TREATMENT

YOUR AIMS ARE:

- To disperse the harmful chemical.
- To arrange transport to the hospital.
- To make the area safe and inform the relevant utility.

1 First make sure that the area is safe. Ventilate the area and, if possible, seal the chemical container. Remove the victim from the area if necessary.

Ask victim if she can identify chemical



2 First, brush off any dry chemicals on the affected area. Then, flush the area with water for at least 20 minutes, to disperse the chemical and stop the burning.

NEVER attempt to neutralize acid or alkali burns unless trained to do so.

DO NOT delay starting treatment by searching for an antidote.

Recognition

There may be:

- ◆ Evidence of chemicals in the vicinity.
- ◆ Intense, stinging pain.
- ◆ Later, discoloration, blistering, peeling, and swelling of the affected area.

See also:

Assess the Situation, page 16.
Hazardous Substances, page 20
Industrial Poisons, page 187.
Inhalation of Fumes, page 70.

Take care not to contaminate yourself: use protective gloves

Hose away from yourself to avoid splashes

3 Gently remove any contaminated clothing while flooding the injury.

4 Take or send the victim to the hospital; watch her airway and breathing closely. Note and pass on any details about the chemical to medical personnel.

IF in the workplace, notify the local safety department or emergency services.

CHEMICAL BURNS TO THE EYE

Splashes of chemicals in the eye can cause serious injury if not treated quickly. Chemicals can damage the surface of the eye, resulting in scarring and even blindness. When irrigating the eye, be especially careful that the contaminated rinsing water does not splash you or the injured. Wear protective gloves if they are available.

Recognition

There may be:

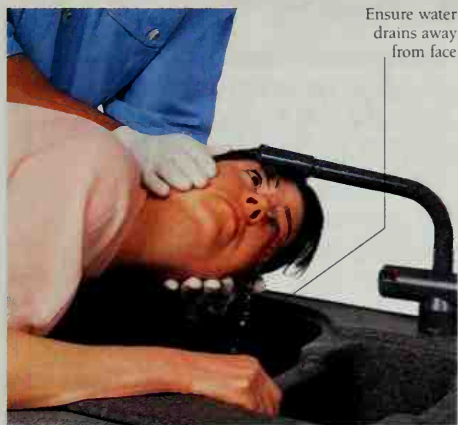
- ◆ Intense pain in the eye.
- ◆ Inability to open the injured eye.
- ◆ Redness and swelling around the eye.
- ◆ Copious watering of the eye.
- ◆ Evidence of chemical substances or containers in the immediate area.

TREATMENT

YOUR AIMS ARE:

- To disperse the harmful chemical.
- To arrange transport to the hospital.

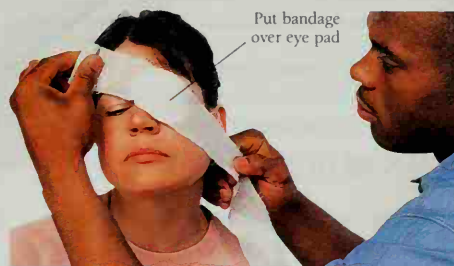
DO NOT allow the victim to touch the injured eye or forcibly remove contact lens.



1 Hold the affected eye under gently running cool water for at least ten minutes. Make sure that you irrigate both sides of the eyelid thoroughly. You may find it easier to pour the water from an eye irrigator or a glass.

IF the eye is shut in a spasm of pain, gently but firmly pull the eyelids open. Be careful that contaminated water does not splash the uninjured eye.

2 Hold a sterile eye pad or a pad of clean, nonfluffy material over the victim's injured eye.



IF some time elapses before the victim receives medical attention, bandage the pad loosely in position.

3 Take or send victim to the hospital. Identify the chemical, if possible.

PEPPER SPRAY

This is an irritant spray used for personal protection and by police to incapacitate someone. It contains chemical irritants that cause severe burning pain in the eyes, accompanied by spasms of the eyelids, as well as tears, but no tissue damage. Symptoms begin to subside rapidly after about 30 minutes.

What you should do

Face the victim into the wind in fresh air and rinse the eyes with water. Discourage rubbing of the eyes or face.

FLASH BURNS TO THE EYE

In this painful condition, which usually affects both eyes, the surface (*cornea*) of the eyes may be damaged by exposure to ultraviolet light, or to prolonged glare from the reflection of the sun's rays off a bright surface. It can take several days to recover. When the burn is caused by a welding torch, the condition is known as "welder's flash."

Recognition

The symptoms and signs do not usually appear until several hours after exposure.

- ◆ Intense pain in the affected eye(s).

There may also be:

- ◆ A "gritty" feeling in the eye(s).
- ◆ Sensitivity to light.
- ◆ Redness and watering of the eye(s).

TREATMENT

YOUR AIMS ARE:

- To prevent further damage.
- To obtain medical attention.

DO NOT remove contact lenses, if any.

1 Reassure the victim. Ask him or her to hold eye pad(s) to the injured eye(s). If it will take some time to obtain medical help, bandage the pad(s) in place.

2 Arrange to take or send the victim to the hospital for medical aid.

SUNBURN

This can be caused by overexposure to the sun or a sunlamp or, rarely, by exposure to radioactivity. Most sunburn is superficial; in severe cases, the skin is lobster-red and blistered and the victim may suffer heatstroke. Some medicines trigger severe reactions to sunlight. At high altitudes, sunburn can occur even

on an overcast summer's day from "skyshine" or reflection from winter snow. If a skin mole changes after exposure to sun, advise the individual to see his or her family physician.

See also:
Heatstroke, page 174.

TREATMENT

YOUR AIMS ARE:

- To move the victim out of the sun.
- To relieve discomfort and pain.

1 Cover the victim's skin with light clothing or a towel. Help her into the shade or, preferably, indoors.

2 Cool her skin by sponging with cool water, or by soaking the affected area in a cool bath for ten minutes.

IF there is extensive blistering or other skin damage, seek medical advice.



3 Give her frequent sips of cold water. If the burns are mild, an after-sun preparation may soothe them.

EFFECTS OF HEAT AND COLD 11

The human body is designed to work best at, or close to, a temperature of 98.6°F (37°C). To maintain this temperature, the body possesses mechanisms that generate and conserve heat when the environment is cold and, conversely, that lose heat when it is hot. These mechanisms are controlled by a special center in the brain. In addition, humans control their environment to some degree through clothing, heating, and air-conditioning, which make it easier for the body to perform well in a wide range of temperatures. In spite of all this, excessive heat or cold can still cause serious or even fatal injury.

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The dangers of extreme temperatures

The harmful effects of extreme heat or cold can be localized, as is the case with frostbite and sunburn, or generalized, as with hypothermia, heat exhaustion, and heatstroke. The generalized effects of extremes of temperature occur more often in the very young and the very old, whose temperature-regulation systems may, respectively, be underdeveloped or impaired.

THE FIRST AIDER SHOULD

- ◆ Remove, or protect, the person from excessively hot or cold surroundings.
- ◆ Restore normal body temperature: if the condition has been rapid in onset (for example, heat exhaustion), reverse it rapidly; if it has developed slowly (for example, hypothermia of slow onset affecting an elderly person), the victim's body temperature must be gradually restored to normal.
- ◆ Obtain appropriate medical attention.

THE BODY TEMPERATURE

To keep the body temperature within its optimum range of 97.8–100.4°F (36–38°C), the body must maintain a constant balance between heat gain and heat loss. A “thermostat” deep within the brain regulates the balance.

The body’s steady heat gain, produced by the conversion of food to energy (metabolism) and by muscular activity, is normally offset by continuous heat loss. Some methods of heat loss are

passive, for example, the natural tendency of body heat to be lost to cool air; some are active, notably, changes within the circulatory system and at the skin.

In hot conditions, blood vessels dilate so that more blood heat may be lost by radiation from the skin. For heat to be conserved, this process is reversed. A rise in temperature beyond the normal range (fever, see page 204) most commonly occurs with infections.

HOW THE BODY KEEPS WARM

Heat is generated in the tissues by:

- Conversion of food to energy in the body’s cells
- Muscle activity, either voluntary (exercise) or, in cold conditions, involuntary (shivering)

Heat is absorbed:

- From outside sources – sun, fire, hot air, hot food or drink, or any hot object in contact with the skin

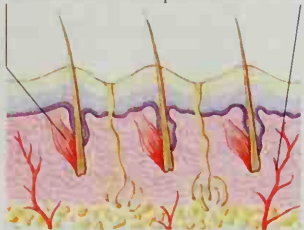
In cold conditions, the body saves heat by:

- Constricting blood vessels at the body surface to keep warm blood in the main part of the body (core)
- Reducing sweating
- Erecting body hairs to “trap” warm air at the skin
- Burning the body’s fat

KEEPING WARM IN THE COLD

Muscles contract to erect hairs

Vessels constrict to preserve blood heat



HOW THE BODY LOSES HEAT

Heat may be lost to:

- Cool surrounding air – by radiation and by evaporation from the skin, and in the breath
- Cool objects in contact with the skin, which provide a “pathway” for heat to escape

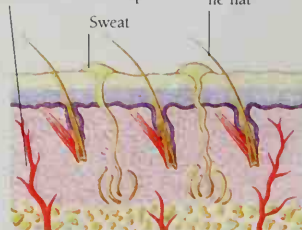
In hot conditions, the body reacts and loses heat by:

- Blood vessels that lie in or near the skin dilating to lose blood heat
- Sweat glands becoming active and secreting sweat; heat is then lost as the sweat evaporates from the skin into the cooler air
- Increased rate and depth of breathing: warm air is expelled, and cool air is drawn in to replace it, cooling the blood as it passes through the lungs

STAYING COOL IN THE HEAT

Vessels dilate to allow blood heat to escape

Hairs lie flat



EFFECTS OF EXTREME COLD

The body reacts to cold by shutting down blood vessels in the skin to prevent "core heat" from escaping. When deprived of warm blood, extremities such as fingers or toes

may freeze in severe conditions, causing frostbite. If the body's core temperature becomes dangerously low, bodily functions slow down (*hypothermia*) and may cease.

FROSTBITE

This condition usually occurs in freezing and often dry and windy conditions. Those who cannot move are particularly vulnerable. The tissues of the extremities freeze – in severe cases this can lead to permanent loss of sensation and, eventually, gangrene.

Frostbite is often accompanied by hypothermia, which should be treated accordingly (see pages 170–72).

Recognition

There may be:

- ◆ At first, "pins-and-needles."
- ◆ Paleness, followed by numbness.
- ◆ A hardening and stiffening of the skin.
- ◆ A color change to the skin of the affected area: first white; then mottled and blue; and eventually black; on recovery, red, hot, painful, and blistered.

TREATMENT

YOUR AIMS ARE:

- To warm the affected area slowly, to prevent further tissue damage.
- To obtain medical aid if necessary.

1 Very gently remove gloves, rings, and any other constrictions, such as boots.

Warm the affected part with your hands, in your lap, or in the person's armpit. Avoid rubbing because it can damage skin and tissues.



Allow person to warm affected part without rubbing

DO NOT put affected part in direct heat, or thaw it if there is danger of it refreezing.

2 Move the person into warmth before you thaw the affected part; carry her if possible when the feet are affected.

3 Place the affected part in warm water (104°F / 40°C). Dry carefully, and apply a dressing of dry gauze bandage.

4 Raise and support the limb to reduce swelling. An adult may take two acetaminophen tablets for intense pain. Transport her to the hospital, if necessary.

IMMERSION (TRENCH) FOOT

This is caused by prolonged exposure to near-freezing temperatures in damp, slushy conditions, and can be aggravated by lack of mobility, tight shoes, and wet socks. The feet will be white, cold, and numb, then red, hot, and painful on rewarming. Treat as for frostbite.

HYPOTHERMIA

This condition develops when the body temperature falls below 95°F (35°C). The effects vary with the speed of onset, and the level to which the temperature falls. Moderate hypothermia can usually be completely reversed. However, deep hypothermia (core temperature below 81°F/28°C) is often fatal. With a hypothermia victim, it is always worth persisting with resuscitation (*see pages 44–58*) until medical help arrives.

How hypothermia can be caused

Hypothermia may develop gradually over several days in poorly heated houses. Infants, the homeless, the elderly, and thin and frail people are particularly vulnerable. Lack of agility, chronic illness, and fatigue all increase the risk; alcohol and drugs can exacerbate the condition.

Hypothermia can also be caused by prolonged exposure to cold outdoors (*see page 172*), especially in wet and windy conditions. Moving air has a

much greater cooling effect than still air: a high “wind-chill factor” can, therefore, substantially increase the risk of a person developing hypothermia.

Death from immersion in cold water may be caused by hypothermia, not drowning. When surrounded by cold water, the body cools 30 times faster than in dry air, leading to a dangerously rapid lowering of body temperature.

Recognition

As hypothermia develops, there may be:

- ◆ Shivering, and cold, pale, dry skin.
- ◆ Apathy, disorientation, or irrational behavior; occasionally belligerence.
- ◆ Lethargy or failing consciousness.
- ◆ Slow and shallow breathing.
- ◆ A slow and weakening pulse.
- ◆ In extreme cases, cardiac arrest.

See also:

Cardiac Arrest, *page 84*.

Drowning, *pages 26 and 68*.

HYPOTHERMIA IN THE ELDERLY

Frail, infirm, and elderly people are at risk from hypothermia if the weather is very cold. They often have inadequate food or heating, and are more likely to suffer from conditions such as arthritis, making them relatively immobile and at greater risk.

As the body ages, it loses its sensitivity to cold, so the elderly may not feel a drop in body temperature. In addition, an elderly person's body is less able to compensate for an extreme temperature change.

What to do

Hypothermia in the home may often develop slowly, and warming should also be gradual (*see right*). Rapid warming should be avoided because it may send cold blood from the body surfaces to the heart and brain too suddenly. Always call a doctor or take the person to the hospital, since this type of hypothermia may hide the symptoms of, or accompany, a stroke or a heart attack.



Gradually warm an elderly person by covering her with layers of blankets in a room temperature of approximately 77°F (25°C).

TREATMENT

YOUR AIMS ARE:

- To prevent the person losing more body heat.
- To rewarm the person.
- To obtain medical aid.

FOR A VICTIM INDOORS

1 For a person brought in from outside, quickly replace any wet clothing with warm, dry garments.

2 The person can be rewarmed by bathing if she is young, fit, and able to climb into the bath unaided. The water should be hot (104°F / 40°C).

DO NOT allow an elderly person to have a bath (see opposite page).

Cover head for additional warmth



Stay until color and warmth return to person's skin

3 Put the person in a bed and ensure that she is well covered. Give her warm drinks, soup, or high-energy foods such as chocolate.

DO NOT place heat sources, such as hot-water bottles or fires, next to the person.

DO NOT give the person any alcohol.

4 It is important that you call a doctor if you have any doubts about the person's condition, or if he or she is elderly (see page 170) or an infant.

If the person becomes unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58).

☎ DIAL 9-1-1 OR CALL EMS

As the person warms up, continue resuscitation, if needed, until help arrives.

HYPOTHERMIA IN INFANTS

Warm baby gradually and keep head covered



A baby's mechanisms for regulating temperature are underdeveloped, so an infant may develop hypothermia in a cold room. The baby's skin may look healthy, but feel cold, and she may be limp, unusually quiet, and refuse to feed.

Rewarm a hypothermic baby gradually. Wrap her in blankets and warm the room. A doctor *must* examine the child.

HYPOTHERMIA (CONTINUED)

YOUR AIMS ARE:

- To prevent the person from losing more body heat.
- To rewarm the person.
- To obtain medical aid.

FOR A VICTIM OUTDOORS

Make sure person has enough clothing, but do not give him yours



PREVENTING HYPOTHERMIA OUTDOORS

Plan outdoor expeditions carefully, and make sure participants are properly supervised. Anyone with even minor illness should not participate; take anyone who is sick or is injured during the expedition to a safe place without delay.

Be equipped for an emergency

Always take a spare sweater, dry socks, dry and well-aired sleeping bags, and a survival bag. Take extra high-energy food and drink, but not alcohol; it dilates the blood vessels and accelerates heat loss.

Dress to beat the cold

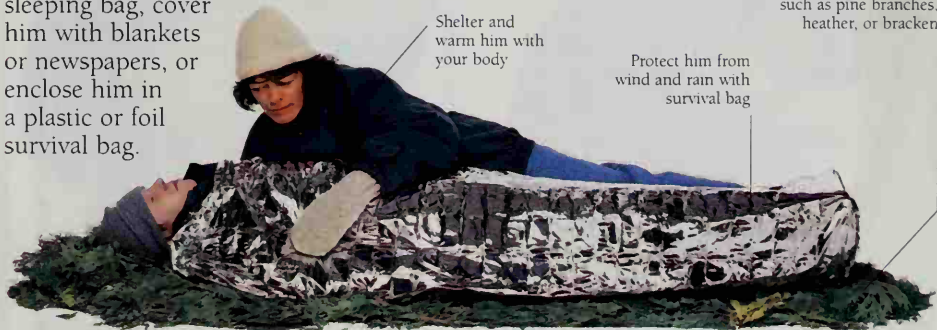
Layers of clothing are more effective than one warm garment. The outer layer should be wind- and waterproof, and capable of being loosened at the neck and wrists. Coats and boots become heavy when wet; if you fall into cold water, remove heavy boots and clothing since their weight may drag you down.

- 1 Insulate the person with extra clothing or blankets, and cover his head.
- 2 Take or carry the person to a sheltered place as quickly as possible.
- 3 Protect the person from the ground and the elements. Put him in a dry sleeping bag, cover him with blankets or newspapers, or enclose him in a plastic or foil survival bag.

Lay person on thick layer of dry insulating material, such as pine branches, heather, or bracken

Shelter and warm him with your body

Protect him from wind and rain with survival bag



- 4 Send for help; in an ideal situation, two people should go. However, it is important that you do not leave the person alone; someone must remain with him at all times.
- 5 Give a conscious person warm drinks, if available.

- 6 When help arrives, evacuate the person to the hospital by stretcher.

IF the person becomes unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58). If necessary, continue resuscitation until medical help arrives.

EFFECTS OF EXTREME HEAT

When the atmospheric temperature is the same as your body temperature, the body cannot lose heat by radiation. If there is also a humid atmosphere, sweat evaporation will be eliminated. In such circumstances, particularly during strenuous exercise when the body generates more heat than usual, either heat exhaustion or heatstroke can occur.

RECREATIONAL DRUG USE

A dangerous and common cause of raised body temperature is that resulting from certain drugs, such as Ecstasy, taken for pleasure. The person sweats profusely due to prolonged overactivity and becomes dehydrated, leading to heat exhaustion. This, coupled with the drug's effect on the brain, can lead to heatstroke.

HEAT EXHAUSTION

This condition usually develops gradually and is caused by loss of salt and water from the body through excessive sweating. It usually happens to people who are unaccustomed to a hot, humid environment. Those who are unwell, especially with illnesses that cause vomiting and diarrhea (see page 210), are also vulnerable.

Recognition

As the condition develops, there may be:

- ◆ Headache, dizziness, and confusion.
- ◆ Loss of appetite, and nausea.
- ◆ Sweating, with pale, clammy skin.
- ◆ Cramps in the arms, legs, or the abdominal wall.
- ◆ Rapid, weakening pulse and breathing.

TREATMENT

YOUR AIMS ARE:

- To cool down the victim.
- To replace lost fluid and salt.

- 1 Help the person to a cool place.
- 1 Lay him down and raise his legs.
- 2 Give him plenty of water; follow, if possible, with weak salt solution (one teaspoon of salt per liter of water).
- 3 Even if the person recovers quickly, he should see a doctor.

IF the person's responses deteriorate, place him in the recovery position (see page 48).

☎ DIAL 9-1-1 OR CALL EMS.

Monitor and record breathing, pulse, and response every ten minutes, and be ready to resuscitate if needed (see pages 44–58).



HEATSTROKE

A failure of the “thermostat” in the brain causes this condition. The body becomes dangerously overheated due to prolonged exposure to heat. In some cases, it follows heat exhaustion when sweating ceases, and the body cannot be cooled by evaporation. Heatstroke can occur suddenly, causing unconsciousness within minutes. This may be signaled by the person feeling uneasy and sick.

Recognition

There may be:

- ◆ Headache, dizziness, and discomfort.
- ◆ Restlessness and confusion.
- ◆ Hot, flushed, and dry skin.
- ◆ A rapid deterioration in the level of consciousness (*see page 110*).
- ◆ A full, bounding pulse.
- ◆ Body temperature above 104°F (40°C).

TREATMENT

YOUR AIMS ARE:

- To lower the body temperature as quickly as possible.
- To arrange transport of the person to the hospital.

1 Quickly move the person to a cool place. Remove as much of his outer clothing as possible.

☎ DIAL 9-1-1 OR CALL EMS.

TAKING A TEMPERATURE

- ◆ Hold the thermometer at the opposite end from the silver liquid bulb.
- ◆ Shake the thermometer, ensuring that the liquid drops well below the normal mark, 98.6°F (37°C).
- ◆ Place the thermometer under the tongue (or armpit for a child), and leave for three minutes. Read the temperature at the point at which the liquid has stopped.

IF the person's responses deteriorate, or he becomes unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (*see pages 44–58*). Place him in the recovery position (*see page 48*).



2 Wrap the person in a cold, wet sheet and keep it wet until his temperature falls to 100.4°F / 38°C (under the tongue) or 99.5°F / 37.5°C (under the armpit).

IF no sheet is available, constantly fan the person, or sponge with cold water.

3 When the person's temperature has fallen to a safe level, replace the wet sheet with a dry one. Monitor the person carefully until help arrives.

IF the person's temperature rises again, repeat the cooling process (*see step 2*).

FOREIGN BODIES

12

Any object, large or small, that finds its way into the body either through a wound in the skin or via one of the body's orifices, such as the ear, nose, eye, vagina, or rectum, is called a "foreign body." Foreign bodies – commonly, specks of dirt or grit – can also rest on, or enter, the eye. These types of injury are often seen by a First Aider. While they are not usually serious, they can be distressing and painful for the injured person. Calm, reassuring, and prompt treatment is essential.

Understanding treatment procedures

This chapter explains how to treat foreign bodies in the skin, eye, nose, and ear. The structure of the eyes, nose, and ears are illustrated and explained to help you understand the treatment required, and to recognize any potential problems. Advice is also given on what to do when an object has been swallowed or inhaled.

People with foreign bodies in the anal or genital orifices should be referred to a doctor. For advice on treating foreign bodies embedded in an open wound, see page 105.

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FIRST-AID PRIORITIES

- ◆ Decide whether it is possible to remove the foreign body. If the object cannot be removed safely, or if you are unsure, obtain medical help.
- ◆ If the foreign body can be removed, reassure the victim and ask him or her to keep still. It may be necessary to be quite firm.
- ◆ Once the object has been removed, take any necessary further action. If you suspect a risk of infection or internal injury, seek a doctor's advice.

FOREIGN BODIES IN THE SKIN

Small foreign bodies such as wood splinters or shards of glass usually cause minor puncture wounds with little or no bleeding. If a portion of the object protrudes from the skin, you may attempt to draw it out. If a foreign body is deeply embedded in a wound, do not remove it; you may cause further injury by doing so.

Foreign bodies in wounds are often contaminated with bacteria and dirt. Always ensure the wound is clean, and that immunization for tetanus is up to date (*see page 106*).

See also:

Foreign Bodies in Minor Wounds, *page 105*.

Infection in Wounds, *page 106*.

Severe External Bleeding, *page 88*.

SPLINTERS

Small splinters of wood, metal, or glass in the skin, particularly of the hands, feet, and knees, are common injuries. The splinter can usually be successfully

removed using tweezers. If the splinter is deeply embedded, lies over a joint, or is difficult to remove, leave it in place and consult a doctor.

TREATMENT

YOUR AIMS ARE:

- To remove the splinter.
- To minimize the risk of infection.

1 Gently clean the area around the splinter with soap and warm water. Sterilize a pair of tweezers by passing them through a flame.



2 Grasp the splinter with the tweezers as close to the skin as possible, and pull it out at the angle it went in.

DO NOT probe the wound with a sharp object, such as a needle, in an attempt to lever out the splinter.

IF the splinter does not come out easily, or breaks, treat it as an embedded foreign body (*see page 105*), and seek medical advice.



3 Squeeze the wound to encourage a little bleeding. Clean the area with soap and water, and apply an adhesive dressing.

4 Check that the victim's tetanus immunization is up to date (*see page 106*). If it is not, or if in doubt, advise the person to see a doctor.

FISHHOOKS

Embedded fishhooks are difficult to pull out because of their barbs; you should only attempt to remove one if medical

aid is not available. If you do remove it, advise the injured to see a doctor if tetanus immunity is in doubt (*see page 106*).

TREATMENT

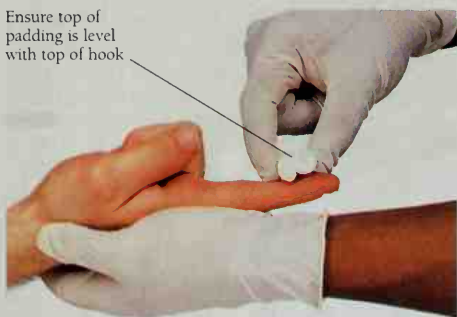
YOUR AIMS ARE:

■ To seek medical aid. If unavailable, to remove the fishhook without causing any further injury and pain.

WHEN MEDICAL AID IS EXPECTED

1 Cut the fishing line as close as possible to the hook.

Ensure top of padding is level with top of hook



2 Build up pads of gauze around the hook until you can bandage over it without pushing it in further.

Do not bandage too tightly

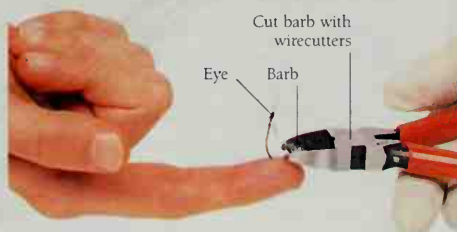


3 Bandage over the padding and the fishhook; take care not to press down on the hook. Seek medical care as soon as possible.

WHEN MEDICAL AID IS NOT READILY AVAILABLE

If the barb is visible

DO NOT pull out a hook unless the barb is cut off.



1 Cut the barb away, and then carefully withdraw the hook by its eye.

2 Clean the wound, then pad around it with gauze and bandage it. Ensure that tetanus immunity is up to date.

If the barb is not visible

Push quickly and firmly



1 If possible, push the hook forwards through the wound, until the barb emerges from the skin.

2 Cut the barb away, then withdraw the fishhook, and dress the wound as described above.

THE EYES, NOSE, AND EARS

These vital parts of the body relay sensory information to the brain for interpretation. Each has a complex, delicate structure and is susceptible

to damage by foreign bodies. A basic knowledge of their anatomy will help you understand the treatment for injuries to these organs.

THE EYES

The eyes allow us to see. Each one is about 1 in (2.5 cm) across, but only a small part is visible, as each eye sits in a protective bony socket in the skull.

Each eye has a colored part (*iris*) with a small opening (*pupil*) that lets in light. A lens in the center focuses light onto a "screen" (*retina*) at the back of the eye

to form an image. Nerve cells in the retina translate images into electrical impulses that travel via the optic nerve to the brain to be analyzed. The front of the eye has a protective layer (*cornea*) and an outer membrane (*conjunctiva*) that is constantly bathed in fluid to keep the surface clean.

Muscles

Six small muscles attached to *sclera* that allow eyeball to move freely in all directions

Sclera

Tough outer layer that maintains eyeball's shape; it is opaque apart from *cornea*

Optic nerve

Nerve that conveys image from *retina* to brain

Retina

Screen of light-sensitive cells on which image forms

Blood vessels

Cornea

Transparent center of *sclera* allows light to reach pupil

Pupil

Opening in center of *iris* that lets in light

Lens

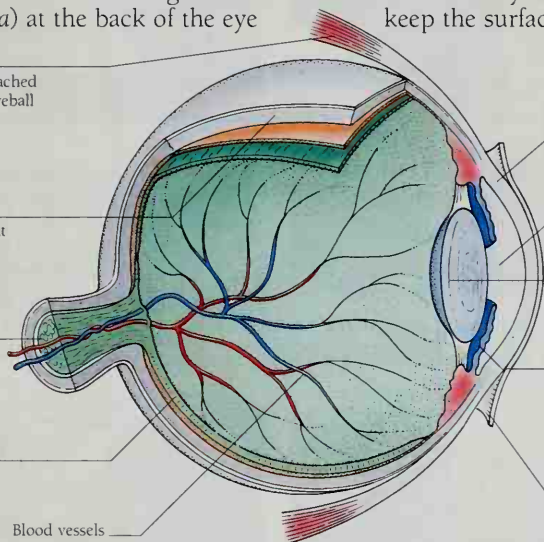
Changes shape to focus light onto *retina*

Iris

Circular, colored layer that adjusts pupil size according to light available

Conjunctiva

Tough membrane that protects eyeball



WHAT CAN GO WRONG

- ◆ Increasing pressure inside the eyeball may damage the optic nerve, and cause a gradual loss of vision. This progressive condition is called *glaucoma*.
- ◆ A cataract is caused by the lens of the eye becoming opaque and reducing the amount of light reaching the retina.

- ◆ Inflammation of the conjunctiva and cornea (*conjunctivitis*) is a common and painful eye condition, characterized by redness, irritation, and rapid blinking.
- ◆ Damage to the cornea through injury or infection may lead to buildup of scar tissue and a permanent defect in vision.

THE NOSE

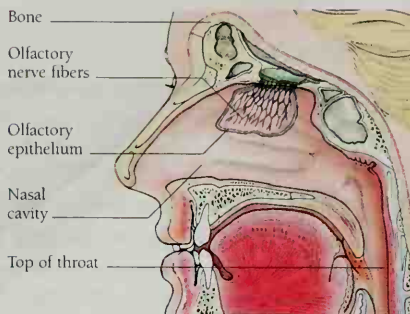
This delicate organ forms an entrance to the respiratory tract (see page 60). It allows air to enter the respiratory system, and also interprets smell and enhances taste.

The nasal cavities are lined with blood vessels and mucous membranes that warm and moisten the air to prevent damage to

the lungs' membranes. The mucus also traps debris, which is moved by tiny hairs (*cilia*) down the throat to be coughed up or swallowed. Special cells (*olfactory epithelia*) in the nasal cavities detect and transmit smells to the brain via *olfactory nerve fibers*.

WHAT CAN GO WRONG

- ◆ Inflamed nasal membranes, sneezing, and congestion are caused by hay fever, a reaction to allergens such as pollen, dust mites, or fungal spores, and by viral infections such as the common cold.
- ◆ Fractures of the nasal bones are often sustained while playing sports.
- ◆ Nosebleeds (see page 102) are due to infection, raised blood pressure, or damage to the blood vessels lining the nasal cavity.

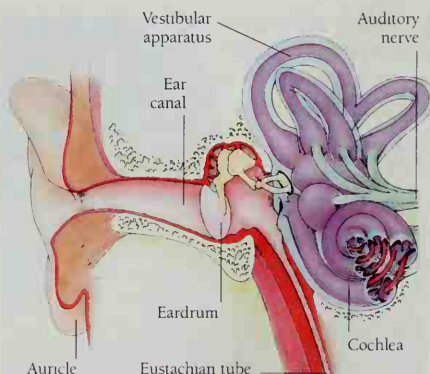


THE EARS

The ears control hearing and balance. Each ear has three parts. The outer ear consists of the visible part (*auricle*), the ear canal, and eardrum. The auricle funnels sound waves into and through the ear canal to vibrate the eardrum. Fine hairs in the canal filter out dust, and glands secrete wax to trap other small foreign particles.

The middle ear is an air-filled cavity with three small bones that transmit sound waves from the eardrum to the inner ear. The middle ear is linked to the back of the nose by the Eustachian tube, which equalizes the air pressure.

The inner ear has two small organs: the *cochlea* and *vestibular apparatus*. The cochlea converts sound vibrations from the eardrum into impulses, and sends them to the brain via the auditory nerve. The vestibular apparatus monitors balance and position.



WHAT CAN GO WRONG

Earache can indicate infection of the outer ear (often after swimming). Infection usually reaches the middle ear via the Eustachian tube. The fluid from infections can become sticky ("glue ear"), often a cause of temporary deafness in children.

FOREIGN BODIES IN THE EYE

A speck of dust, loose eyelash, or even a contact lens can literally float on the white of the eye, and is usually easily removed. However, anything that sticks to the eye, penetrates the eyeball, or rests on the colored part of the eye (the pupil and iris, see page 178) should not be touched.

Recognition

There may be:

- ◆ Blurred vision.
- ◆ Pain or discomfort.
- ◆ Redness and watering of the eye.
- ◆ Eyelids screwed up in spasm.

See also:

Eye Wounds, page 98.

TREATMENT

YOUR AIM IS:

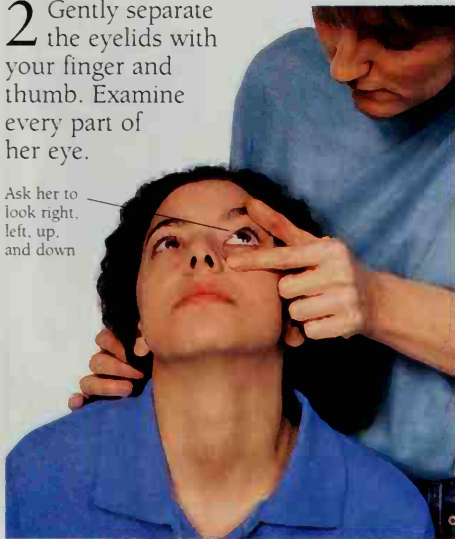
- To prevent injury to the eye.

1 Advise the injured person not to rub her eye. Sit her down facing the light.

DO NOT touch anything that is sticking to, or embedded in, the eyeball, or over the colored part of the eye.

2 Gently separate the eyelids with your finger and thumb. Examine every part of her eye.

Ask her to look right, left, up, and down



3 If you can see a foreign body on the white of the eye, wash it out with a glass or an eyewash, and clean water.

4 If this is unsuccessful, providing the foreign body is not stuck in place, lift it off with a moist swab, or the damp corner of a tissue or clean handkerchief.

Ask casualty to pull down upper lid



IF the foreign body is sticking to or embedded in the eye, cover the affected eye with an eye pad and a bandage, then take or send the injured to the hospital.

IF the object is under the upper eyelid, ask her to grasp her lashes and pull the lid over the lower lid. Blinking under water may also make the object float clear.

FOREIGN BODIES IN THE NOSE

Young children may push small objects up their noses. These can cause blockage and infection and, if they are sharp, may also damage the tissues of the nostrils. You must not try to extricate these items; you may cause injury or push the object in farther.

Recognition

There may be:

- ◆ Difficulty in breathing, or noisy breathing through the nose.
- ◆ Swelling of the nose.
- ◆ Smelly or blood-stained discharge; this may indicate an object that has been lodged for some time.

TREATMENT

YOUR AIM IS:

- To obtain medical attention.

1 Keep the child quiet and calm. Tell him or her to breathe through the mouth at a normal rate.

DO NOT attempt to remove the foreign body with your fingers or any instrument, even if you can see it.

2 Arrange to take or send the child to the hospital.

FOREIGN BODIES IN THE EAR

If an object becomes lodged in the ear, it can cause temporary deafness by blocking the ear canal, or may damage the eardrum. Young children often push

objects into their ears; people leave cotton wool in the ear after cleaning it. Insects can fly or crawl into the ear; their buzzing or movement may cause alarm.

TREATMENT

YOUR AIMS ARE:

- To prevent injury to the ear.
- To obtain medical attention for a lodged foreign body.
- To remove a trapped insect.

FOR A LODGED FOREIGN BODY

DO NOT attempt to remove the object. You may cause serious injury and push the foreign body in even further.

Arrange to take or send the injured person or child to the hospital as soon as possible. Reassure them during the journey, or until medical help arrives.

FOR AN INSECT IN THE EAR

1 Reassure the person, and sit her down.

Support head with affected ear uppermost



2 Gently flood the ear with tepid water so that the insect floats out.

3 If this is unsuccessful, take or send the person to the hospital.

SWALLOWED FOREIGN BODIES

Small objects such as coins, safety pins, or buttons can easily be swallowed by young children. If the object is sharp, it may damage the digestive tract. Small, smooth objects

are unlikely to cause this type of injury, but they can cause choking or poisoning.

See also:

Choking Baby and Child, page 66.

TREATMENT

YOUR AIM IS:

- To obtain medical attention.

FOR SHARP OR LARGE OBJECTS

☎ **DIAL 9-1-1 OR CALL EMS.**

Reassure the injured. Arrange to take or send them to the hospital for medical aid.

DO NOT give the injured anything to eat or drink – an anesthetic may be administered at the hospital.

FOR SMALL, SMOOTH OBJECTS

Reassure the injured, and seek medical advice from a doctor.

INHALED FOREIGN BODIES

Small, smooth objects can slip past the protective mechanisms within the throat and enter the air passages. Dry peanuts, which can swell up when in contact with body fluids, pose a particular danger in young children as they can be inhaled into the lungs, causing serious damage. Some people are allergic to nuts, which may cause anaphylactic shock (see page 81).

Recognition

There may be:

- ◆ Some sign or noise of choking, which quickly passes.
- ◆ A persistent dry cough.
- ◆ Difficulty breathing.

See also:

Choking, pages 64–67.

TREATMENT

YOUR AIM IS:

- To obtain urgent medical attention.

1 Treat the person for choking, if necessary (see pages 64–7).

☎ **DIAL 9-1-1 OR CALL EMS.**

2 Reassure the victim while waiting for the ambulance. Try to discover from him or any bystanders what kind of foreign body has been inhaled, and inform the emergency medical services.

POISONING

13

Poisoning is often accidental, but can also be deliberate (for example, in cases of attempted suicide). It can occur as a result of accidents, or be caused by eating contaminated food or poisonous plants. Drugs and alcohol can also poison the body.

Recognizing and treating poisoning

The effects of poisoning vary depending on the type and amount of poison absorbed, and it is advisable to seek medical attention. Although poisoning can be fatal, most cases are treatable. In all cases, it will help the doctor if you can identify the poison involved. If a conscious victim or an onlooker cannot identify it, look for clues, such as tablets, a suspect container, or alcohol on the breath. Most states have a Poison Control Center that gives information to the public; look in your telephone directory under Poison Information.

This chapter deals with acute poisoning – most often encountered by a First Aider in an emergency. Acute poisoning comes on suddenly, as opposed to chronic poisoning, for example by lead, which affects the body over a longer period of time.

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FIRST-AID PRIORITIES

- ◆ Open an unconscious victim's airway, and monitor airway, breathing, and circulation.
- ◆ Prevent further injury from:
 - SWALLOWED POISONS: do not attempt to induce vomiting, as this may harm the victim further.
 - INHALED POISONS: remove the victim from danger and into fresh air. Do not endanger yourself.
 - ABSORBED POISONS: flush away any residual chemical on the skin or in the eyes.
- ◆ Obtain appropriate medical assistance.

WHAT IS A POISON?

A poison is a substance which, if taken into the body in sufficient quantity, may cause temporary or permanent damage. Poisons may be swallowed, inhaled, absorbed through the skin, splashed into the eye, or injected. Natural poisons (*toxins*) are those which originate from bacteria or certain plants, and animals such as snakes.

Once in the body, poisons may work their way into the bloodstream and be swiftly carried to all the tissues of the body. Signs and symptoms vary depending on the poison and its method of entry, and can be delayed in onset.

Vomiting is common in many cases, and carries with it the additional danger of the victim inhaling his or her own vomit, and choking.

THE EXCRETORY SYSTEM

The body "processes" food to extract its nutrients and eliminate waste that has many mildly poisonous elements. From the stomach, food passes into the small intestine, where nutrients are absorbed into the blood.

Blood is filtered through the liver, which inactivates many poisons. The kidneys also filter the blood and excrete impurities in urine. The food residue passes to the large intestine, and waste is expelled at the anus.

HOW POISONS ENTER THE BODY

Poisons may enter an eye, possibly causing chemical burns

Poisonous gases, solvents, vapors, or fumes may be inhaled

Injected poisons and drugs enter bloodstream rapidly; dangerous drugs, particularly narcotics, are injected by abusers; poisonous snakes, fish, or insects may inject venom into skin

Liver

Swallowed poisons may enter circulatory system through walls of digestive tract

Strong chemicals, such as corrosives and pesticides, or plant toxins, may be absorbed through skin, and cause burns

HOW POISONS AFFECT THE BODY

Poisons reaching brain may cause confusion, delirium, seizures, and unconsciousness

Swallowed corrosives can burn lips, mouth, and food passages

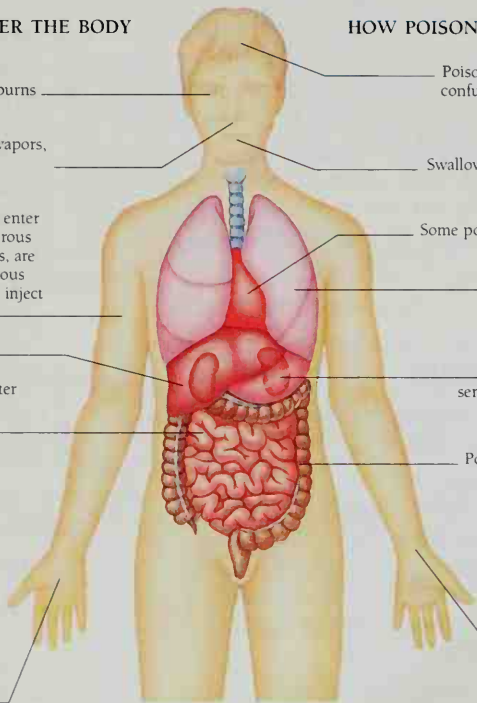
Some poisons disturb action of heart

Inhaled poisons can cause severe respiratory distress

"Overload" of poisons can seriously damage body's poison filters (liver and kidneys)

Poison in digestive system can cause vomiting, abdominal pain, and diarrhea

Poisons may damage blood, preventing red cells from carrying oxygen to tissues



HOUSEHOLD POISONS

Almost every household contains potentially poisonous substances, such as bleach, dishwasher detergent, paint stripper, and weedkiller. These can be spilled, resulting in chemical burns, or swallowed, causing poisoning. Children in particular are at risk from poisoning by household products.

See also:

Chemical Burns, page 164.

Drug Poisoning, page 186.

Inhalation of Gases, page 70.

Unconsciousness, page 110.

HOW TO PREVENT POISONING

- ◆ Keep toxic chemicals out of children's reach and sight (*not* under the sink).
- ◆ Keep all medicine locked away.
- ◆ Leave poisonous household substances in their original containers. Never store them in old soft-drinks bottles; children are commonly misled by such containers and try to drink the contents.
- ◆ Buy medicines and household substances in child-resistant containers.
- ◆ Dispose appropriately of any medicine that is no longer wanted.

TREATMENT

YOUR AIMS ARE:

- To maintain the airway, breathing, and circulation.
- To remove any contaminated clothing.
- To identify the poison.
- To obtain medical aid.

FOR SWALLOWED POISONS

- 1 Check and, if necessary, clear the victim's airway (*see* page 47).

To use a face shield, place the oval tube between the victim's teeth. Seal your lips around the top of the tube to begin mouth-to-mouth respiration.



IF the victim becomes unconscious, check breathing and pulse, and be prepared to resuscitate if necessary (*see* pages 44–58). Place him in the recovery position (*see* page 48).

IF you need to give mouth-to-mouth respiration and there are chemicals on the victim's mouth, use a plastic face shield, if possible, to protect yourself.

NEVER attempt to induce vomiting.

- 2 ☎ **DIAL 9-1-1 OR CALL EMS**, giving information about the swallowed poison, if possible.

IF a conscious victim's lips are burned by corrosive substances, rinse mouth with cold water.

DRUG POISONING

This condition can result from an accidental or deliberate overdose of prescribed or over-the-counter drugs, or from drug abuse. The signs and symptoms of drug poisoning vary

depending on the type of drug taken and the method of entry into the body (*see chart below*).

See also:

Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To maintain the airway, breathing, and circulation.
- To arrange transport to the hospital.

1 Check and, if necessary, clear the victim's airway (*see page 47*).

IF the victim is unconscious, check breathing and pulse, and be prepared to resuscitate the person if necessary (*see pages 44–58*).

2 Place the victim in the recovery position (*see page 48*).

DO NOT induce vomiting. It is often ineffective, and it may cause the victim further harm.

3 ☎ **DIAL 9-1-1 OR CALL EMS.** Keep samples of vomited material. Look for clues to the identity of the drug, such as containers. Send these with the victim to the hospital.

DRUG	EFFECTS
Painkillers: Aspirin	<ul style="list-style-type: none"> • Upper abdominal pain, nausea, and vomiting (possibly blood-stained) • Ringing in the ears • "Sighing" when breathing • Confusion and delirium
Painkillers: Acetaminophen	<ul style="list-style-type: none"> • Little effect at first • Later, features of liver damage: upper abdominal pain and tenderness, nausea, and vomiting
Nervous system depressants, tranquilizers, and antidepressants Barbiturates and benzodiazepines	<ul style="list-style-type: none"> • Lethargy and sleepiness, leading to unconsciousness • Shallow breathing • A weak, irregular, or abnormally slow or fast pulse • Antidepressants can lead to sudden onset of seizures
Stimulants and hallucinogens Amphetamines (such as Ecstasy) and LSD (commonly swallowed); cocaine (commonly inhaled or "snorted")	<ul style="list-style-type: none"> • Excitable, hyperactive behavior, wildness, and frenzy • Sweating • Tremor of the hands • Hallucinations: the victim may be "hearing" voices or "seeing" things
Narcotics (commonly injected) Morphine, heroin	<ul style="list-style-type: none"> • Constricted pupils • Sluggishness and confusion, possibly leading to unconsciousness • Slow, shallow breathing, which may cease • Needle marks may be infected, or infection introduced by dirty needles
Solvents (commonly inhaled) Glue, lighter fuel	<ul style="list-style-type: none"> • Nausea, vomiting, and headaches • Hallucinations • Possibly, unconsciousness • Rarely, cardiac arrest

INDUSTRIAL POISONS

Poisoning can occur in the workplace as a result of a leak, failure of a chemical plant, or a major accident; or in a public place following a traffic collision. Most cases of industrial poisoning involve poisonous gases. Spillage of corrosive chemicals can also result in burns. Factories using potentially dangerous chemicals or

gases may keep oxygen equipment, and must display notices indicating the emergency procedures. Workers should be familiar with such advice.

See also:

Chemical Burns, page 164.

Hazardous Substances, page 20.

Inhalation of Gases, page 70.

Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To remove the victim from danger.
- To maintain an open airway.
- To arrange transport to the hospital.

FOR INHALED GASES

Give oxygen if trained to do so



1 If possible, remove the victim from danger and into fresh air.

☎ DIAL 9-1-1 OR CALL EMS.

Administer oxygen if you have been trained in its use.

DO NOT enter a gas-filled room unless you are authorized and are properly equipped to do so.

IF he is unconscious, open airway, check breathing and pulse, and be prepared to resuscitate if needed (see pages 44–58).

2 Place the victim in the recovery position (see page 48).

FOR CHEMICALS ON THE SKIN

1 Brush off any solid chemicals, then flush away residual chemicals with plenty of cold water.



Make sure water drains away from victim and yourself

DO NOT contaminate yourself with the dangerous chemical or the rinsing water.

2 **☎ DIAL 9-1-1 OR CALL EMS.**

Make sure that you give details of the chemical.

IF the victim becomes unconscious, open the airway, check breathing and pulse, and be ready to resuscitate. Place her in the recovery position (see page 48).

ALCOHOL POISONING

Alcohol (chemical name, *ethanol*) is a drug that depresses the activity of the central nervous system. Prolonged intake can severely impair all physical and mental abilities, and deep unconsciousness may ensue.

Dangers of alcohol poisoning

- ◆ An unconscious victim risks inhaling and choking on vomit.
- ◆ Alcohol dilates the blood vessels, so hypothermia may develop if the victim is exposed to cold.
- ◆ A victim with head injuries who smells of alcohol may be misdiagnosed and not receive appropriate treatment.

Recognition

There may be:

- ◆ A strong smell of alcohol.
- ◆ Unconsciousness: the victim may be roused, but will quickly relapse.
- ◆ A flushed and moist face.
- ◆ Deep, noisy breathing.
- ◆ A full, bounding pulse.

In the later stages of unconsciousness:

- ◆ A dry, bloated appearance to the face.
- ◆ Shallow breathing.
- ◆ Dilated pupils that react poorly to light.
- ◆ A weak, rapid pulse.

See also:

Hypothermia, page 170

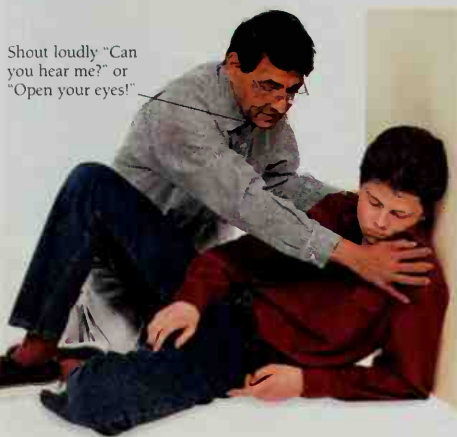
Drunkenness, page 122.

Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To maintain an open airway.
- To seek medical attention for the victim.



1 Check the victim's level of consciousness. Gently tap his shoulders and speak to him loudly and clearly to see if he responds.

IF the victim is unconscious, open the airway, check breathing and pulse, and be prepared to resuscitate if necessary (see pages 44–58).

IF in doubt or you suspect head injury,
☎ **DIAL 9-1-1 OR CALL EMS.**



2 Place the victim in the recovery position (see page 48). Protect him from cold, if possible; insulate him from the ground and cover him.

POISONOUS PLANTS

In the U.S., there are relatively few very poisonous plants which can cause serious illness if eaten. A number of other plants are mildly poisonous. Young children

are most at risk, as they are attracted to brightly colored berries and seeds, and are liable to eat them.

See also:

Unconsciousness, page 110.

TREATMENT

YOUR AIMS ARE:

- To maintain the airway, breathing, and circulation.
- To obtain medical aid.

1 Check and, if necessary, clear the victim's airway (see page 47).

IF the victim is unconscious, check breathing and pulse, and be prepared to resuscitate if needed (see pages 44–58). Put the person in the recovery position (see page 48); he or she may vomit.

DO NOT induce vomiting. It is often ineffective, and may cause the victim further harm.

2 If you are concerned, call a doctor or **DIAL 9-1-1 OR CALL EMS.**

3 Try to identify the plant, and which part of it has been eaten. Preserve pieces of the plant, and samples of any vomited material, and send with the victim to the hospital.

PLANTS THAT ARE POISONOUS IF SWALLOWED

Seeds, bulbs, and rhizomes



Laburnum
(flower)



Iris (root
and flower)



Lupin
(seed and
flower)



Berries



Holly



Mistletoe

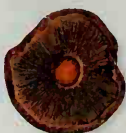


Wild arum



Yew

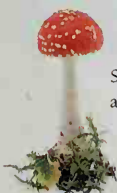
Mushrooms



Brown roll rim



Spotted fly
agaric



Death cap



FOOD POISONING

This may be caused by eating food that is contaminated by bacteria or by toxins produced by bacteria that were already in the food.

Types of food poisoning

Bacterial food poisoning is often caused by the *Salmonella* group of bacteria (associated with farm animals). Symptoms may appear rapidly or be delayed for a day or so.

Toxic food poisoning is frequently caused by toxins produced by the bacteria group of *Staphylococcus*. Symptoms usually develop rapidly, possibly within two to six hours of eating the affected food.

See also:

Shock, page 78.

Vomiting and Diarrhea, page 210.

Recognition

There may be:

- ◆ Nausea and vomiting.
- ◆ Cramping abdominal pains.
- ◆ Diarrhea (possibly bloodstained).
- ◆ Headache or fever.
- ◆ Features of shock.
- ◆ Collapse.

PREVENTING FOOD POISONING

- ◆ Ensure that frozen poultry and meat is fully defrosted before it is cooked.
- ◆ Cook meat, poultry, fish, and eggs thoroughly to kill harmful bacteria.
- ◆ Never keep food lukewarm for long periods; bacteria can multiply without obvious signs of spoilage.
- ◆ Wash hands before preparing food.
- ◆ Wear protective gloves or bandages if you have cuts on your hands.

TREATMENT

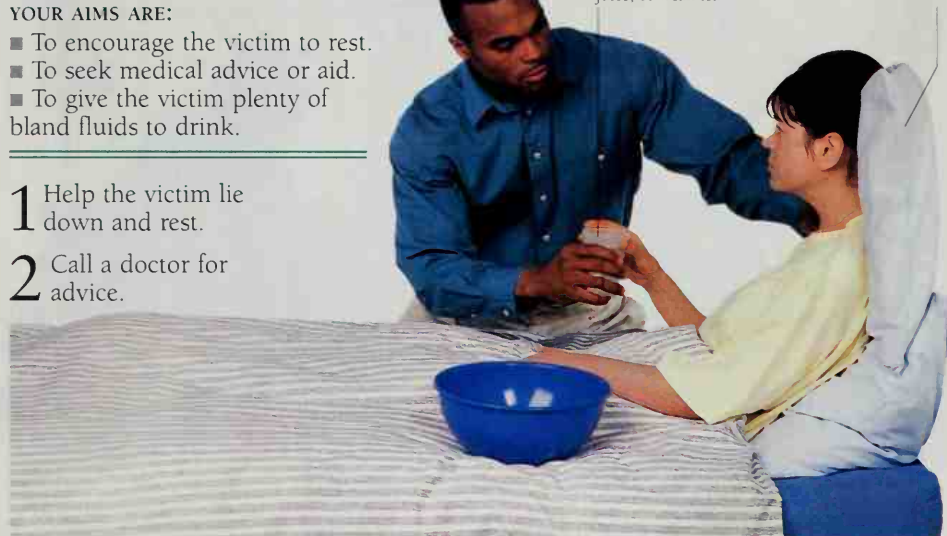
YOUR AIMS ARE:

- To encourage the victim to rest.
- To seek medical advice or aid.
- To give the victim plenty of bland fluids to drink.

- 1 Help the victim lie down and rest.
- 2 Call a doctor for advice.

Give bland fluids such as water, diluted fruit juice, or weak tea

Keep victim warm and comfortable



- 3 Give the victim plenty to drink, and a container to use if she vomits.

IF the victim's condition worsens,
☎ DIAL 9-1-1 OR CALL EMS.

BITES AND STINGS

14

Most animals and insects do not usually attack unless injured or otherwise provoked, and common sense can prevent many bites and stings. You must always take sensible precautions before attempting, for example, to rescue someone from an angry dog or a swarm of bees. If you cannot cope alone, get help or call the emergency services.

Knowing when to seek medical attention

Although insect and marine stings can ruin a picnic or day at the beach, they are often minor injuries, and first aid alone usually relieves any pain.

Animal (and human) bites, however, always require medical attention, because animals harbor bacteria in their mouths. Even if you have cleaned and dressed a bite wound satisfactorily, you must ensure that the victim is protected from serious infections such as rabies and tetanus.

Snake bites carry additional risk of poisoning. You must take care even when handling a dead animal; the venom of many creatures, particularly snakes, is just as active when the animals are dead.

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FIRST-AID PRIORITIES

- ◆ Make sure that you are in no danger, then remove the victim from further danger.
- ◆ Treat any visible wound or painful symptoms, and minimize the risk of further injury and infection.
- ◆ Obtain medical attention if necessary.
- ◆ Note the time and nature of the injury, and identify the attacking creature if possible. This enables medical personnel to deal with the injury itself and to anticipate possible complications, such as anaphylactic shock (see page 81).

ANIMAL BITES

Bites from sharp, pointed teeth cause deep puncture wounds that can carry bacteria deep into the tissues. Human bites also crush the tissues. Hitting someone's teeth with a bare fist can produce a "bite" wound at the knuckles. Any bite that breaks the

skin creates a wound very vulnerable to infection; it needs prompt first aid and medical attention.

See also:

Minor Wounds, page 104.

Severe External Bleeding, page 88.

Tetanus, page 106.

TREATMENT

YOUR AIMS ARE:

- To control bleeding.
- To minimize the risk of infection, both to the victim and yourself.
- To obtain medical attention.

FOR SERIOUS WOUNDS

1 Control bleeding by applying direct pressure and raising the injured part.



2 Cover the wound with a sterile dressing or a clean pad bandaged in place.



3 Arrange to take or send the victim to the hospital.

FOR SUPERFICIAL BITES

1 Wash the wound thoroughly with soap and warm water.



2 Pat the wound dry with clean gauze swabs and cover with an adhesive dressing or a small sterile dressing.

3 Advise the victim to see a doctor in case immunization is needed.

POTENTIAL INFECTIONS

Rabies is a potentially fatal viral infection of the nervous system, spread in the saliva of infected animals. Suspect rabies if bitten by a domestic animal behaving unusually, or if bitten by any wild animal, especially skunks, bats, or foxes. The animal must be examined to confirm rabies. Seek the help of the police to secure a suspect animal.

There is probably only a small risk of hepatitis B or C viruses being transmitted through a human bite – and even less risk with the HIV (AIDS) virus. If you are concerned about the possibility of infection, seek medical advice.

INSECT STINGS

Bee, wasp, and hornet stings usually are painful rather than dangerous. An initial sharp pain is followed by mild swelling and soreness, which first aid can relieve. Some people are allergic to stings and can rapidly develop the serious condition of anaphylactic

shock. Multiple stings can also be dangerous. Stings in the mouth or throat are serious, as the swelling they cause can obstruct the airway.

See also:

Anaphylactic Shock, page 81.

Breathing Difficulties, page 72.

TREATMENT

YOUR AIMS ARE:

- To relieve swelling and pain.
- To transport to the hospital if necessary.

FOR A STING IN THE SKIN



IF the person shows signs of anaphylactic shock,

☎ DIAL 9-1-1 OR CALL EMS.

1 If the stinger is still in the wound, pluck it out firmly with fine tweezers.

2 Apply a cold compress (see page 221) to relieve pain and minimize swelling. Advise the person to see his doctor if the pain and swelling persist.

FOR A STING IN THE MOUTH

1 Give the person ice to suck or cold water to sip, to minimize swelling. If he or she has difficulty breathing,

☎ DIAL 9-1-1 OR CALL EMS.

TICK BITES

Ticks are tiny, spiderlike creatures found in grass or woodlands. They attach themselves to passing animals (including humans) and bite into the skin to suck blood. An unfed tick is very small and may not be noticed, particularly as its bite is painless, but when sucking blood, a tick swells to the size of a pea and can then easily be seen.

Ticks can carry disease and cause infection, so they should be removed as soon as possible. In some regions of the US, tick bites can spread Lyme disease. Seek medical attention after tick bites.



Removing a tick

Using fine-pointed tweezers, gently grasp the tick's head as close to the person's skin as possible. Use a slight back-and-forth action to lever, rather than pull, the head out. The mouthparts will be very firmly embedded in the skin; try to avoid breaking the tick and leaving the buried head behind.

INJURIES BY MARINE CREATURES

Sea creatures can cause injury in a number of ways. Painful stings can be caused by jellyfish and the related Portuguese man-of-war, corals, and sea anemones. Their venom is contained in special stinging cells (*nematocysts*) that stick to the victim's skin. The poison is released when each stinging cell ruptures.

If a spiny creature such as a sea urchin is accidentally stepped on, its spines may puncture the skin and break off to become embedded in the sole of the foot. A painful local

reaction will usually develop, although, fortunately, serious general effects are rare.

Most marine species normally encountered in temperate regions are not very poisonous. In some parts of the world, particularly in tropical regions, severe poisoning can occur, and occasionally death results from a severe allergic reaction (anaphylactic shock), or paralysis of the chest muscles leads to drowning.

See also:

Anaphylactic Shock, page 81.



Portuguese man-of-war

This is actually a jellyfish-like, floating colony of creatures, with stinging tentacles that leave painful welts on the skin. The venom is rarely fatal, but multiple stings may cause problems.



Sea anemone

These small creatures are commonly encountered in rock pools. If touched or stepped on, venomous stinging cells on their tentacles, which surround the anemone's "mouth," may inflict great pain.



Leeches

Leeches are found in freshwater and attach themselves painlessly to the skin where they feed on blood. Sprinkling them with salt, or applying heat from a match, will cause them to fall off.

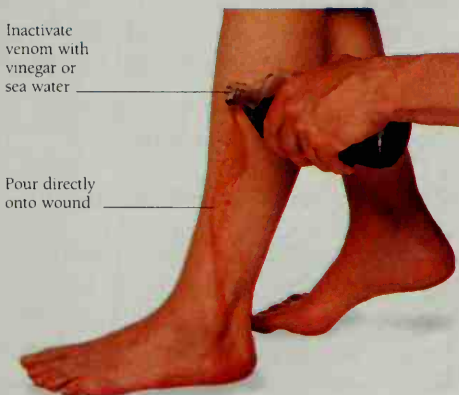
TREATMENT FOR MARINE STINGS

YOUR AIMS ARE:

- To reassure the victim.
- To inactivate stinging cells before they release their venom, and to neutralize any free venom.
- To relieve pain and discomfort.

Inactivate venom with vinegar or sea water

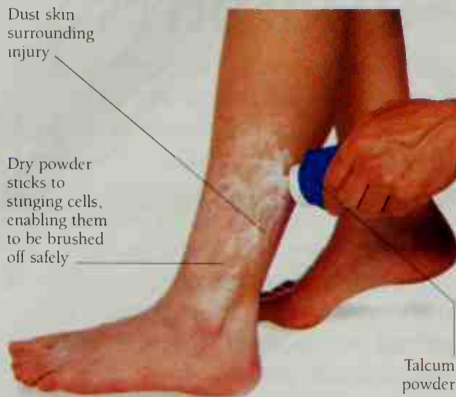
Pour directly onto wound



Dust skin surrounding injury

Dry powder sticks to stinging cells, enabling them to be brushed off safely

Talcum powder



2 Dust a dry powder over the skin around the affected area to make any remaining stinging cells stick together. Meat tenderizer (used in barbecue cooking) contains a substance called papain, which inactivates venom.

3 Gently brush off the powder with a clean, nonfluffy pad.

IF the injuries are severe, or there is a serious general reaction (see page 81), **☎ DIAL 9-1-1 OR CALL EMS.**

IF the victim is having difficulty breathing, she may be in anaphylactic shock; treat as described on page 81.

1 Reassure the victim and sit him or her down. Pour copious amounts of vinegar or seawater over the injury to incapacitate stinging cells that have not yet released venom. Alcohol may aggravate the injury and should not be used. Avoid rubbing sand on the affected area.

TREATMENT FOR MARINE PUNCTURE WOUNDS

YOUR AIMS ARE:

- To inactivate the venom.
- To obtain medical aid.

1 Put the injured part in water as hot as the victim can bear for at least 30 minutes. Add more hot water as it cools, being careful not to scald the victim.

2 Take or send the victim to the hospital, where spines remaining in the skin may have to be removed.



Check first that water is not too hot

SNAKE BITES

The only poisonous snakes that are native to the US are pit vipers (rattlesnakes, copperheads and cotton mouth mocassins) and coral snakes. However, more exotic snakes are kept as pets. A snakebite is a potentially serious injury, and is always very frightening. Reassurance is vital, for if the victim keeps still and calm, the spread of venom may be delayed.

If you can, put the snake in a secure container (take care, as its venom is active whether it is dead or alive). Otherwise, make a note of its

appearance; this may help if anti-venom must be administered. Notify the police if the snake is not captured.

Recognition

Signs and symptoms depend on the species

- ◆ A pair of puncture marks.
- ◆ Severe pain at the site of the bite.
- ◆ Redness and swelling around the bite.
- ◆ Nausea and vomiting.
- ◆ Labored breathing; in extreme cases, respiration may stop altogether.
- ◆ Disturbed vision.
- ◆ Increased salivation and sweating.

TREATMENT

YOUR AIMS ARE:

- To reassure the victim.
- To prevent the spread of venom through the body.
- To arrange urgent transport of the victim to the hospital.

1 Lay the victim down. Tell her to keep calm and still.

2 Wash the wound well and pat dry with clean swabs.

☎ DIAL 9-1-1 OR CALL EMS.



Keep heart above level of wounded part to contain venom locally

Broad-fold bandage

Soft padding

Tie narrow-fold bandage in figure-eight on foot

DO NOT apply a tourniquet, slash the wound with a knife, or suck out the venom.

3 Lightly compress the limb above the wound with a roller bandage. Immobilize the injury (see pages 130–31).

IF she stops breathing, be ready to resuscitate (see pages 44–58) if needed.



EMERGENCY CHILDBIRTH

15

As a First Aider, there are two situations in which you may have to administer first aid to a pregnant woman: childbirth and miscarriage. Childbirth is a natural and often lengthy process, so if a woman goes into labor, there is no need to panic. Only very rarely is there no time to get the mother to the hospital before the baby arrives. If this happens, you should not attempt to deliver the baby – this will happen naturally. Your role is to care for the baby, and comfort and listen to the wishes and advice of the mother, especially if she has experience giving birth.

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Miscarriage

Miscarriage, or *spontaneous abortion* of the fetus, is fairly common – about 20% of pregnancies end this way – and of these, 80% occur in the second or third month of pregnancy. The possibility of severe bleeding makes it potentially dangerous, so the woman must receive urgent medical attention and be treated with extreme sensitivity throughout this distressing experience. A fetus can also be lost through an induced abortion or as a result of an ectopic pregnancy (one that develops outside the womb or *uterus*, usually in the *fallopian tubes*).

FIRST-AID PRIORITIES

Childbirth

- ◆ Be calm and reassure the mother.
- ◆ Seek expert help.
- ◆ Male First Aiders should seek a female assistant.
- ◆ *Do not* try to delay childbirth.

Miscarriage

- ◆ Obtain medical assistance as soon as possible.

CHILDBIRTH

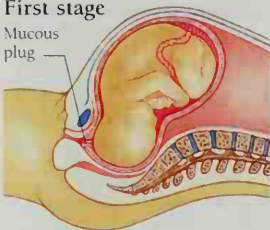
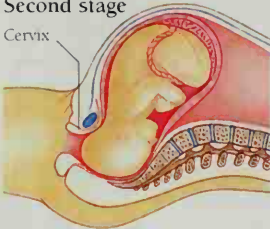
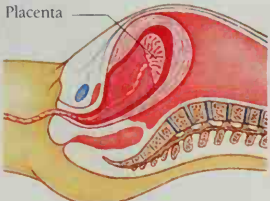
Most expectant mothers will be well prepared for what will happen during labor. However, a woman who goes into labor unexpectedly may become very anxious, and you will need to reassure her. If she is calm, she will be better able to remember any procedures she has been taught.

Most labors last for several hours and are straightforward, so there is usually plenty of time to arrange

transport to the hospital or to seek medical assistance. You should never try to delay a birth. Always allow a delivery to proceed without interference. The baby will be expelled naturally, so do not pull at the emerging head or shoulders.

Once the baby is delivered, wrap him or her in something warm to guard against hypothermia, then give the baby to the mother.

THE THREE STAGES OF LABOR

	What happens	Symptoms and Signs
First stage 	<ul style="list-style-type: none"> • Neck (<i>cervix</i>) of the womb (<i>uterus</i>) begins to enlarge (<i>dilate</i>); this can take 12–14 hours • Mucous plug, protecting the womb from infection, may be expelled • “Water” (<i>amniotic fluid</i>) breaks as the need for protection ends 	<ul style="list-style-type: none"> • Regular contractions, increasing in frequency • Bloodstained discharge or “show,” if the mucous plug is expelled • “Water” flows out in a trickle or a rush, depending on the position of the baby
Second stage 	<ul style="list-style-type: none"> • This stage takes up to two hours, and begins when the cervix is fully dilated • Baby descends from the womb towards the vaginal entrance • Baby is in close contact with the muscle of the womb • Vagina stretches to allow the baby to be expelled 	<ul style="list-style-type: none"> • Mother experiences an involuntary urge to push • Pressure on the muscle of the womb stimulates stronger, more frequent, contractions • Stinging or burning sensation may occur in the vagina as it is stretched • Head emerges and the baby is pushed out rapidly
Third stage 	<ul style="list-style-type: none"> • Afterbirth (<i>placenta and umbilical cord</i>) is naturally expelled, about 10–30 minutes after the baby is born • Womb should contract, closing down the area to which the placenta is attached and stopping the bleeding 	<ul style="list-style-type: none"> • Mild contractions before the afterbirth is expelled • Some bleeding occurs once the afterbirth is delivered • More severe bleeding can occur if the womb does not contract sufficiently (<i>postpartum</i> or after-delivery <i>hemorrhage</i>) For treatment, see page 201.

THE START OF LABOR

The first stage of labor begins when the neck (*cervix*) of the womb opens and begins to enlarge, or *dilate* (see *opposite*). The mother will be experiencing contractions, which are waves of intense pain that peak and then fade away. You will need to give her a great deal of reassurance and make her comfortable.

THE PRENATAL RECORD

Some women may have a copy of their prenatal record. Check the record for information, or any complications, so that you can alert the medical services. The mother may be able to interpret some of the information for you.

WHAT YOU SHOULD DO

YOUR AIM IS:

- To obtain medical aid and arrange removal to the hospital.

- 1 Contact her doctor or midwife, or **DIAL 9-1-1 OR CALL EMS**, giving any information from her prenatal record.
- 2 Allow the mother to assume the most comfortable position for her. Massaging her lower back can help to relieve pain.

DO NOT let her have a bath if her water has broken, as this can cause infection.



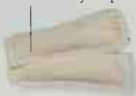
WHAT YOU WILL NEED FOR THE DELIVERY

Ensure that the area is warm.
If possible, gather together a few essentials.

You will need:

- ◆ clean, warm towels and a blanket;
- ◆ an improvised cot (a box or drawer lined with soft material);
- ◆ disposable gloves;
- ◆ plastic bags;
- ◆ sanitary napkins;
- ◆ handkerchiefs to wear as face masks;
- ◆ a bowl of hot water for washing;
- ◆ newspapers or a plastic sheet.

Sanitary napkins



Disposable gloves



Clean, warm towels



Plastic bags



THE DELIVERY

In the second stage, the baby will be delivered. This begins when the cervix is fully dilated (*see page 198*) and lasts until the baby arrives, which could take as little as an hour. You need to prepare a comfortable and clean environment (*see right*) in preparation for the delivery.

The number of people present should be kept to a minimum, but do not exclude anyone whom the mother wishes to be present. You may want to enlist the help of a female friend or relative.

The delivery will happen naturally. However, it will be your responsibility to ensure the comfort and protection of the baby once he or she is born.

PREVENTING INFECTION

It is extremely important to pay strict attention to hygiene when preparing for, and during, the delivery.

- ◆ Keep anyone with a sore throat, cold, or open sores on the hands well away.
- ◆ Wear a face mask. You can improvise one from a clean handkerchief or a folded triangular bandage.
- ◆ Remove your jacket, if any; roll up your sleeves. If possible, wear a plastic apron.
- ◆ Wash your hands and scrub your nails thoroughly for about five minutes. Wear disposable gloves, if available.
- ◆ After delivery, wash your hands again.

WHAT YOU SHOULD DO

YOUR AIMS ARE:

- To ensure the mother is comfortable.
- To prevent cross-infection.
- To care for the baby.

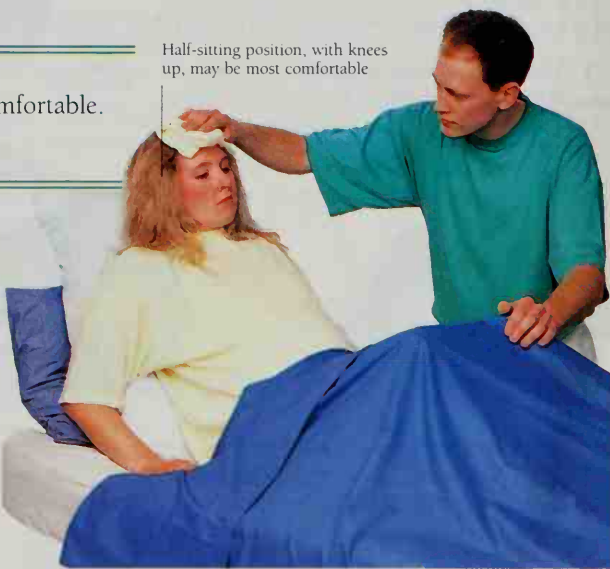
1 Cover the delivery area with plastic sheeting, newspaper, or towels for warmth and to absorb blood and fluids. Help the woman into a comfortable position. Make sure that her back and shoulders are supported.

2 Make sure that the ambulance is on its way, and any important details have been passed on, such as the expected delivery date, any medical needs, or the name of the hospital.

3 Check that the mother has removed any clothing that might interfere with the birth; cover her if she prefers.

DO NOT allow the mother to drink. If she is thirsty, moisten her lips with water.

Half-sitting position, with knees up, may be most comfortable



4 Once the widest part of the baby's head is visible, make sure that the mother stops pushing and starts panting.

IF there is membrane covering the baby's face, wipe it away so that he can breathe.

5 The baby's head and shoulders will soon appear. Allow the baby to be expelled naturally; this happens quickly.

DO NOT pull on the baby's head.
DO NOT pull on the baby's shoulders.

IF the umbilical cord is wrapped around the baby's neck, you should first check that it is loose, then very carefully pull it over the head to protect the baby from strangulation.

6 Support the baby as he is delivered. Lift him away from the birth canal. Newborn babies are slippery, and need to be handled carefully. Gently pass him to the mother, and lay him on her stomach.

DO NOT pull on or cut the umbilical cord.

7 The baby should start to cry at this point; if this does not happen, then immediately carry out the ABC of resuscitation (see pages 54–58).

DO NOT smack the baby.

8 Wrap the baby in a clean cloth or blanket, and give him to the mother. When lying the baby down, keep him on his side with his head low down, so that any fluid or mucus can drain easily from his nose and mouth.



DELIVERY OF THE AFTERBIRTH

In the third stage, the baby will have been delivered, but the mother will still need your assistance while she delivers the afterbirth (the placenta and cord).

She will still be having mild contractions until it is expelled. The cord, which may continue to pulsate, should be left uncut until help arrives.

WHAT YOU SHOULD DO

YOUR AIMS ARE:

- To support the mother while she is delivering the afterbirth.
- To preserve the afterbirth.

1 Encourage the mother while she is delivering the afterbirth.

DO NOT pull on the umbilical cord.
DO NOT cut the umbilical cord.

2 Keep the afterbirth intact, preferably in a plastic bag, until a doctor or midwife examines it and cuts the cord. Even a small piece of the afterbirth left inside the mother can be dangerous.

3 Provide warm water, clean towels, and sanitary napkins for the mother.

4 It is normal for the mother to bleed slightly. Gentle massage of the mother's lower abdomen after delivery of the placenta will help the womb to contract and harden, and stop bleeding. Tell the mother what you are doing.

IF a placenta remains in the womb for a long period of time (a so-called "retained placenta,") the woman requires medical help as soon as possible for its removal. However, the afterbirth may come out very soon after the birth of the baby.

DO NOT try to pull on the umbilical cord, or in any way try to pull the afterbirth out, as this can cause the woman serious harm. Wait until medical help arrives.

MISCARRIAGE

A miscarriage is the loss of the fetus or embryo at any time before the 20th week of pregnancy. Some pregnant women experience a "threatened miscarriage" with slight vaginal bleeding. Miscarriages carry the danger of severe bleeding and of shock. Any woman who is, or appears to be, miscarrying must be seen by a doctor.

Remember that the woman may be frightened and very distressed at this time. Although your efforts may be rejected, offer her as much help as you can without being intrusive.

A woman who suspects that she is miscarrying may be reluctant to confide in a stranger, particularly if that person is a man.

Recognition

- ◆ Cramplike pains in the lower abdomen or pelvic area.
- ◆ Signs of shock.
- ◆ Vaginal bleeding, possibly sudden and profuse.
- ◆ Passage of the fetus and other products of conception.

See also:

Shock, page 78.

Vaginal Bleeding, page 103.

WHAT YOU SHOULD DO

YOUR AIMS ARE:

- To reassure and comfort the woman.
- To obtain medical help.

- 1 Reassure the woman. Help her into the most comfortable position.
- 2 Find a sanitary napkin or clean towel for the woman to use.
- 3 Monitor and *record* breathing and pulse every ten minutes.
- 4 Keep any expelled material and pass it to the medical services. Keep it out of the woman's sight, if possible.

IF the bleeding or pain is only slight, call a doctor.



Prop knees up with cushion or blanket to ease strain on abdomen

IF the bleeding or pain is severe,

☎ DIAL 9-1-1 OR CALL EMS.

Treat the woman for shock (see page 78).

OTHER CAUSES OF SEVERE BLEEDING

Symptoms that are similar to natural, or spontaneous, miscarriage can be caused by other events such as a heavy period, induced abortion, or ectopic pregnancy. In an ectopic pregnancy, the fertilized egg does not develop as it should in the womb

(uterus), but in the *fallopian tube* or even in the abdominal cavity. This is a life-threatening condition. The symptoms will usually include severe abdominal pain and vaginal bleeding. All these patients should be transported to the hospital.

MISCELLANEOUS CONDITIONS

16

The boundary between first aid and home medicine is often blurred. Many everyday conditions (for example, headaches, cramp, or a raised temperature) develop quickly and need prompt treatment. While some of the common ailments described in this chapter are not included in formal first-aid training, they will nevertheless benefit from sensible first-aid measures. Common sense and good preparation can also help to prevent and treat illness while traveling overseas.

The use of medicines

This chapter describes the use of acetaminophen and other tablets to relieve fever and pain; however, giving medication is not strictly within the scope of first aid. It is important to consult a doctor or pharmacist before administering any medication. More guidance is given on this subject on page 39. There are many sources which provide extensive information on most medications available in the US.

When to seek medical aid

An apparently minor complaint can sometimes be the start of a serious illness. If you are in any doubt about your ability to deal with any condition, you should always consult a doctor, even if it is only by telephone.

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FIRST-AID PRIORITIES

- ◆ Make the victim as comfortable as possible.
- ◆ If simple measures fail to provide relief within an hour or so, seek medical advice.

FEVER

A sustained body temperature above the normal level of 98.6°F (37°C) is known as fever. It is usually caused by a bacterial or viral infection, and may be associated with influenza, measles, chicken pox, meningitis, earache, sore throat, or local infections, such as pneumonia or an abscess.

When to call a doctor

A moderate fever is not harmful, but a temperature of above 104°F (40°C) can be worrisome, and may trigger seizures in babies and young children. If you are in any doubt, call a doctor.

Recognition

- ◆ Raised under-the-tongue temperature.

In the early stages:

- ◆ Pallor.
- ◆ A "chilled" feeling – "goosebumps," shivering, and chattering teeth.

As the fever advances:

- ◆ Hot, flushed skin, and sweating.
- ◆ Headache.
- ◆ Generalized "aches and pains."
- ◆ Higher temperature.

See also:

Heatstroke, page 174.

Convulsions in Young Children, page 118.

TREATMENT

YOUR AIMS ARE:

- To make the person comfortable.
- To bring down the fever.
- To seek medical aid if necessary.

1 Make the person comfortable in cool surroundings, preferably in bed with a light cover. Allow her to rest.



2 Give the person plenty of cool, bland drinks to replace lost fluids.

3 Adults may take acetaminophen, ibuprofen, or aspirin tablets. Give a child the recommended dose of acetaminophen or ibuprofen (*not* aspirin).

IF you are worried, call a doctor.

BACTERIAL MENINGITIS

This is a very serious condition which must be treated promptly, so early recognition is crucial. Meningitis can be difficult to recognize because many of its symptoms are similar to those of less serious conditions such as 'flu. If in any doubt, you should call a doctor immediately. Symptoms can develop rapidly, often within a few hours. They may include:

- ◆ fever;
- ◆ vomiting or loss of appetite;
- ◆ headache (in babies, the sign is slight tenseness of the soft parts of the skull, or *fontanelles*);
- ◆ sleepiness or confusion;
- ◆ sensitivity to light;
- ◆ stiffness in the neck;
- ◆ convulsions;
- ◆ a change for the worse in a child who has recently had an infection;
- ◆ a rash of red or purple blood spots (*purpuric rash*).

A simple way of confirming purpuric rash is to press the side of a glass lightly against the rash. If the rash disappears under pressure, it is not a purpuric rash.

HEADACHE

A headache may accompany any illness, particularly a feverish ailment such as 'flu, but it may be the most prominent symptom of a serious condition, such as meningitis (see *previous page*) or stroke. Mild "poisoning" caused by a fume-filled atmosphere, or by excess alcohol or any other drug, can induce a headache in an otherwise healthy person.

Headaches may develop for no apparent reason, but can often be traced to tiredness, nervous tension, stress or emotional upset, or undue

heat or cold. Headaches can range from constant low-grade discomfort to "blinding" pain that is completely incapacitating (see *box, below*).

When to call a doctor

Always seek urgent advice if the pain:

- ◆ develops very suddenly;
- ◆ is severe and incapacitating;
- ◆ is recurrent or persistent;
- ◆ is accompanied by loss of strength or sensation, or impaired consciousness;
- ◆ is accompanied by a stiff neck;
- ◆ follows a head injury.

TREATMENT

YOUR AIMS ARE:

- To relieve the pain.
- To seek medical aid if necessary.

Cold compress
may give relief



1 Help the person sit or lie down in a quiet place. If possible, remedy any likely cause of the pain, such as loud noise, bright light, or lack of fresh air.

2 An adult may take acetaminophen, aspirin, or ibuprofen tablets. Give a child the recommended dose of acetaminophen or ibuprofen (*not* aspirin).

IF in doubt or if the pain does not ease within two hours, call a doctor.

MIGRAINE

Many people are prone to these severe, "sickening" headaches. They can be triggered by a variety of causes, such as allergy, stress, or fatigue. Migraine sufferers usually recognize an attack and know best how to deal with it. They may carry special medicines with them.

Migraines usually follow a pattern

- ◆ There may be a warning period with disturbance of vision, in the form of flickering lights and/or a "blind patch."
- ◆ An intense throbbing headache may develop, sometimes just on one side.
- ◆ There may be discomfort in the upper abdomen, nausea, and vomiting.
- ◆ The victim will not be able to tolerate any bright light or loud noise.

What you can do

Treatment for migraine is the same as for any severe headache. Help the person to take any special medication he or she may have (such as tablets or nasal sprays) and provide some towels and a container in case he or she vomits. The migraine sufferer will often recover from an attack after lying down or sleeping for a few hours in a quiet, dark room.

EARACHE

An infection of the middle ear is the most common cause of earache, particularly in children. It often accompanies a cold, tonsillitis, or flu. Occasionally, pressure builds up in the middle ear causing the eardrum to rupture. This allows pus and other matter to be discharged from the outer ear, which may bring

temporary relief from pain. Earache can also be caused by an infection (see page 179), a boil, or a foreign body lodged in the ear canal, or be the result of another condition such as an abscess in a nearby tooth.

All common types of earaches may be accompanied by partial or total hearing loss that is usually temporary.

TREATMENT

YOUR AIMS ARE:

- To relieve pain.
- To obtain medical aid if necessary.

FOR THROBBING EARACHE

IF there is a discharge, fever, or marked hearing loss, call a doctor immediately.

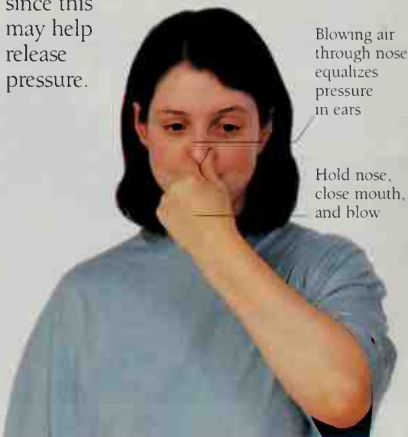
- 1 Adults may take acetaminophen, ibuprofen or aspirin tablets. Give a child the recommended dose of acetaminophen or ibuprofen(not aspirin).
- 2 Give the person a source of heat (such as a hot-water bottle wrapped in a towel) to hold against the affected ear. Let her sit up if lying flat makes the pain worse.



- 3 Advise the person to see her doctor. If you are worried about the person's condition (particularly if it is a child), call a doctor immediately.

PRESSURE-CHANGE EARACHE

Many people are prone to pressure-change earache on airplane journeys. It may help to chew gum or suck a candy. Remember that gum or hard candies should never be given to young children, who may choke. They should be allowed to cry instead, since this may help release pressure.



Blowing air through nose equalizes pressure in ears

Hold nose, close mouth, and blow

What you can do

Tell the person to swallow with her mouth wide open. If this fails to make the ears "pop," tell her to close her mouth, hold her nose tightly closed, and "blow" her nose.

If nothing helps, reassure the person that the pain will go away when the pressure in the middle ear equalizes (for example, when the airplane lands).

TOOTHACHE

Persistent toothache is usually caused by a decayed tooth and can be made worse by hot or cold food or drinks. Throbbing toothache indicates an infection; there may be some swelling

of the gums in the painful area and bad breath. What appears to be "toothache" can be caused by conditions affecting the facial nerves such as sinusitis or an ear infection.

TREATMENT

YOUR AIMS ARE:

- To relieve pain.
- To ensure the person sees a dentist.

1 Adults may take acetaminophen, aspirin, or ibuprofen tablets. Give a child the recommended dose of acetaminophen or ibuprofen (*not* aspirin).

2 Make the person comfortable. If lying down makes the pain worse, prop her up with pillows.

3 There are two ways of helping out: either give her a hot-water bottle wrapped in a towel to hold to her face, or a rolled-up piece of gauze soaked in



oil of cloves to hold against the affected tooth. The gauze will plug the cavity and the oil is a natural pain reliever.

4 Arrange an early appointment with a dentist, or seek medical attention.

SORE THROAT

The most common cause of a sore throat is the inflammation of the tissues at the back of the mouth. Coughs and colds caused by viruses often start with a sore throat. Sometimes the tonsils at the back of the throat become infected with

bacteria or a virus. The tonsils and surrounding tissues redden and white spots of pus or ulcers may appear.

IF you suspect tonsillitis, advise the person to make an appointment to see a doctor as soon as possible.

TREATMENT

YOUR AIMS ARE:

- To relieve pain.
- To obtain medical aid if necessary.

1 Give the person plenty of fluids to drink, to ease the pain and to stop the throat becoming dry.

2 Adults may take acetaminophen, aspirin, or ibuprofen tablets. Give a child the recommended dose of acetaminophen or ibuprofen (*not* aspirin).

IF the person cannot even swallow water, seek urgent medical attention immediately.

ABDOMINAL PAIN

Pain in the abdomen often has a relatively trivial cause, but can indicate serious disease, such as perforation or obstruction of the intestine.

Intestinal distension or obstruction causes pain that comes and goes in "waves" (*colic*). This often makes the person double up in agony and can be accompanied by vomiting.

A perforated intestine or leakage of its contents into the abdominal cavity causes inflammation of the cavity lining (*peritonitis*). This potentially life-threatening condition causes sudden, intense pain, made worse by movement or abdominal pressure.

See also:

Food Poisoning, page 190.

TREATMENT

YOUR AIMS ARE:

- To relieve pain and discomfort.
- To obtain medical aid if necessary.



Put child on her side if she is vomiting

1 Make the person comfortable, and prop her up if breathing is difficult. Give her a container to use if vomiting.

DO NOT give the person any medicines or anything to eat or drink.

2 Give the person a covered hot-water bottle to place against the abdomen.

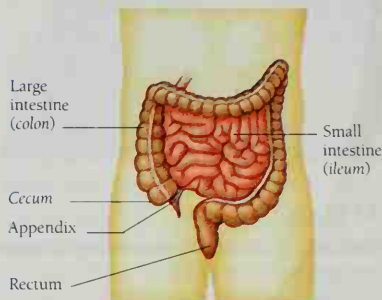
IF the pain is severe, or does not ease within 30 minutes, call a doctor.

WINDING

A blow to the upper abdomen may stun a local nerve junction, causing a temporary breathing problem. Sit the person down; loosen clothing at the chest or waist. Recovery should be rapid.

APPENDICITIS

An acutely inflamed appendix (known as *appendicitis*) is common especially in children. Symptoms include severe pain (usually in the lower right abdomen), loss of appetite, nausea, vomiting, bad breath, and fever. If the appendix bursts, *peritonitis* will develop. Treatment requires surgical removal of the appendix.

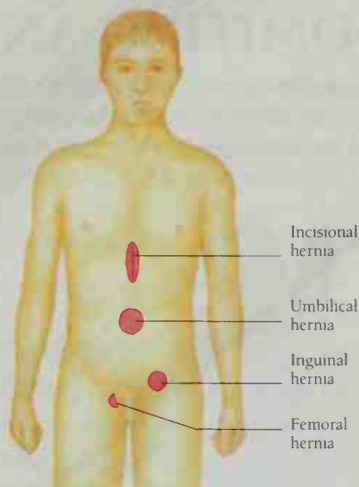


Location of the appendix

The appendix is a short tube attached to the lower end of the large intestine (cecum). It has no known function in humans. Inflammation usually occurs when the tube becomes blocked or ulcerated.

HERNIA

A hernia (rupture) is a protrusion of parts of the abdominal contents (often a small loop of intestine) through a weak part of the muscular wall. It may result from coughing or heavy exertion. The swelling may disappear if the person lies down. If it is painful, and especially if it occurs with vomiting and abdominal pain, the hernia is "strangulated" and needs urgent surgical attention.



Common sites of hernia

Hernias may occur in the groin, at the navel, or through a scar.

Recognition

- ◆ Bulge or swelling in abdominal wall.
- ◆ Pain in abdomen or groin.
- ◆ Vomiting.

TREATMENT

YOUR AIMS ARE:

- To reassure the person and relieve discomfort.
- To obtain medical aid.

FOR A PAINLESS HERNIA

Try to reassure the person. Without causing him or her needless alarm, tell the person to arrange to see his or her own doctor about the condition as soon as possible.

DO NOT attempt to push in the swelling or allow the person to do so either.

FOR A PAINFUL HERNIA

1 Support the person in the position he finds most comfortable, by propping him up with cushions or pillows.

Person with abdominal pain may prefer to bend his knees



Use a folded pillow or rolled-up jacket as support

2 Call a doctor or, if the pain is severe, **DIAL 9-1-1 OR CALL EMS.**

VOMITING AND DIARRHEA

The causes of vomiting and diarrhea are most likely to be viral infections, food poisoning, contaminated water, or allergy (*see page 213*). Vomiting may, of course, occur without diarrhea, and vice versa. When both

occur together there is an increased risk of dehydration, especially in infants, young children, and the elderly, which can be serious.

See also:

Food Poisoning, *page 190*.

TREATMENT

YOUR AIM IS:

- To restore lost fluid and salts.

1 Reassure the person while he or she is being sick. Afterward, give the person a warm damp cloth with which to wash him- or herself.

2 Give the person lots of bland fluids to sip slowly and often. If the appetite returns, give him only bland, starchy or sugary food for the first few hours.

IF you are worried about the person's condition, particularly if it is persistent, call a doctor.

SUITABLE DRINKS

Water is sufficient in most cases, but "isotonic" glucose drinks are ideal, if available. Alternatively, you can obtain an oral rehydrating solution from a pharmacist. Older children or adults may use juices or flat soft drinks as well.

VERTIGO

Various ear disorders (*see page 179*) can cause an abnormal sensation of movement, with the person feeling "dizzy," as if he or she is revolving in space. This condition is called vertigo. It is fairly common and often produces nausea and vomiting. Vertigo has many causes, including

temporary conditions, such as ear or viral infections. Some medications can also trigger the complaint. In rare cases, vertigo indicates a more serious condition, such as stroke, Ménière's disease (a disorder of the inner ear) or multiple sclerosis.

TREATMENT

YOUR AIMS ARE:

- To relieve pain.
- To obtain medical aid if necessary.

1 Place the person in a comfortable position and note any change in his or her condition.

2 The person may have special medication prescribed for this condition. If so, he or she may need help to take it.

3 Call a doctor if the person is very distressed or requests medical help. If necessary, ☎ **DIAL 9-1-1 OR CALL EMS.**

CRAMP

This is a sudden, involuntary, and painful muscle spasm. It commonly occurs during sleep, but can also happen after strenuous exercise, when it is caused by chemicals building up in the muscle, or by excessive loss of

salt and fluid from the body through profuse sweating. Cramp is often relieved by stretching and massaging the affected muscle.

See also:

Heat Exhaustion, page 173.

TREATMENT

YOUR AIM IS:

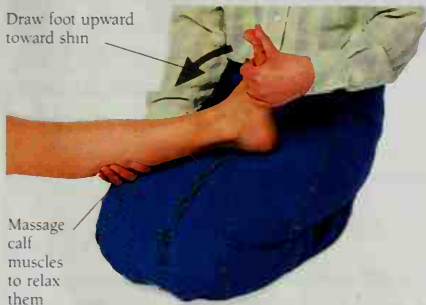
- To relieve both spasm and pain.

FOR CRAMP IN THE FOOT



Help the person to stand with her weight on the front of her foot. When the first spasm has passed, massage the foot.

FOR CRAMP IN THE CALF

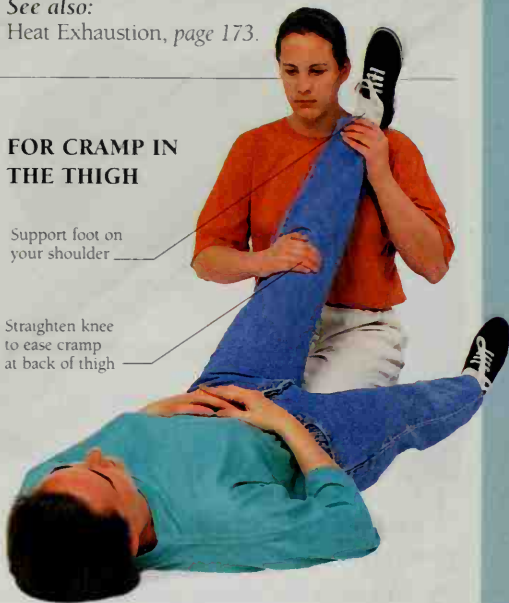


Straighten the person's knee, and draw her foot firmly and steadily upward toward the shin. Massage the muscles.

FOR CRAMP IN THE THIGH

Support foot on your shoulder

Straighten knee to ease cramp at back of thigh



For cramp in the back of the thigh, straighten the person's knee by raising the leg. Bend the knee for cramp in the front of the thigh. In each case, massage the affected muscle firmly with your fingers until the pain eases.

STITCH

This common condition is usually associated with exercise, when pain is felt in the muscles of the trunk and the sides of the chest. The probable cause is the accumulation of waste products such as lactic acid in the muscles. The pain can be similar to that of angina (see page 82), but it is usually sharper.

If a casualty is suffering from a stitch, sit him or her down and be reassuring; the pain will usually ease quickly.

HYSTERIA

This is a rather vague term, which is often incorrectly used. True hysteria is a subconscious condition, caused by psychological stress, that manifests itself as some physical complaint, such as blindness.

We are more likely to apply the term "hysterical" to someone who is "over-reacting," possibly at the scene of an accident or on learning that a relative has died. People with this type of hysteria need to be handled firmly and positively.

TREATMENT

YOUR AIM IS:

- To help the person calm down and regain self-control.

1 Escort the person to a quiet place, away from onlookers. Be firm and positive and do not over-sympathize.

2 Stay with the person quietly until he has recovered. Advise him to consult his doctor.

DO NOT throw any water over the person's face.

DO NOT slap the person's face.

DO NOT use force to restrain them.

Recognition

There may be:

- ◆ Attention-seeking behavior, such as shouting or rolling on the ground, that is usually made worse by the presence of an audience.
- ◆ Hyperventilation, which may induce spasm in the wrists and hands.
- ◆ Marked tremor or "paralysis;" the person is apparently unable to move.

See also:

Hyperventilation, page 72.



PANIC ATTACK

Some people occasionally display anxiety out of proportion to the stress they are actually experiencing. Attacks can be unpredictable with symptoms developing suddenly. Although they are distressing, panic attacks are harmless and do not last long. Signs of an attack include:

- ◆ tension producing headaches, backache, and chest pains;

- ◆ nervous overactivity, palpitations, trembling, sweating, and difficulty in swallowing;
- ◆ hyperventilation (see page 72).

What you can do

Treat as for hysteria. It is very important that the person sees a doctor, so that the cause of the attack can be treated.

HICCUPS

These short, repeated, noisy intakes of air are caused by involuntary contractions of the diaphragm, working against a partially closed windpipe. Hiccups are common and

usually last only for a few minutes. While short attacks are simply a nuisance, prolonged attacks can be very distressing, with the person feeling tired and in pain.

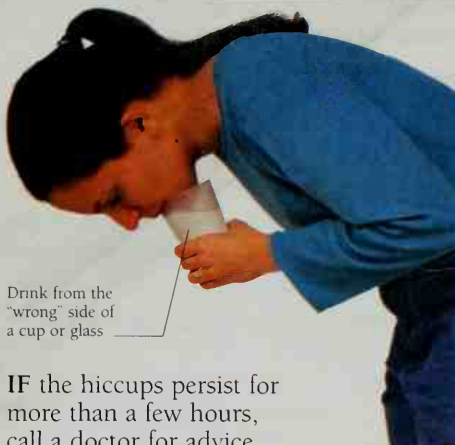
TREATMENT

YOUR AIM IS:

- To try and reassure the person who is suffering with hiccups.

Try any or all of the following methods

- ◆ Tell the person to sit quietly and hold her breath for as long as possible.
- ◆ Make her take long drinks from the "wrong" side of a cup or glass.
- ◆ Place a paper (*not* plastic) bag over the nose and mouth and get the person to rebreathe her expired air for a minute to increase carbon dioxide in the blood.



Drink from the "wrong" side of a cup or glass

IF the hiccups persist for more than a few hours, call a doctor for advice.

ALLERGY

In the same way that the body makes antibodies to combat germs, it may also make antibodies to other substances – pollen, foods, chemicals, drugs – that are regularly touched, inhaled, or swallowed. These could result in an allergy – an adverse reaction, caused by a hypersensitivity to some substance that is not generally recognized to be harmful. Allergies cause problems in one of three ways, but reactions can overlap.

- ◆ Respiratory allergies may result in asthma (*see page 73*) or in hay fever.
- ◆ Intestinal allergies may produce abdominal pain (*see page 208*), vomiting, and diarrhea (*see page 210*).
- ◆ Skin allergies may take the form of hives (*urticaria*) or dermatitis.
- ◆ Rarely, a generalized allergic reaction (*anaphylactic shock*) occurs that needs urgent medical attention.

See also:

Anaphylactic shock, *page 81*.

TREATMENT

YOUR AIM IS:

- To treat any symptoms.
- To obtain medical aid if necessary.

- 1 Treat any symptoms, for example, vomiting or an itchy rash.
- 2 Advise the person to see his or her doctor. Call a doctor if in doubt.

ILLNESS AND OVERSEAS TRAVEL

With the increase in travel, many people are now at risk from diseases that are not commonly encountered in their own country. A hot climate brings problems of its own, such as heat exhaustion and sunburn, to those who are unused to it.

The value of good preparation

When planning any foreign travel, obtain as much information as you can about the health problems of the

area you are visiting. Many conditions can be avoided by common-sense measures (*see below*), and some can be prevented by vaccination (which is normally available from your doctor) before travelling.

See also:

Bites and Stings, pages 191–96.

Effects of Extreme Heat, page 173–74.

Rabies, page 192.

Sunburn, page 166.

Vomiting and Diarrhea, page 210.

COMMON AILMENTS ENCOUNTERED OVERSEAS

Condition	Cause and features	Prevention
Malaria	The most common disease in the world, malaria affects around 200 million people every year. It is transmitted by a mosquito bite and is prevalent in almost all tropical and sub-tropical areas. In the early stages, malaria resembles 'flu, with fever and headache.	In affected areas, wear enveloping clothing, use insect repellent and mosquito nets, and take anti-malarial tablets which must be started before travel and continued on return. Anyone developing a fever in, or on return from, an infected area should be seen by a doctor.
Prickly heat	This is a highly irritating, prickly red rash caused by inflamed sweat glands. The rash particularly affects areas that are not well aerated. Sufferers are more prone to heatstroke.	Maintain good personal hygiene and wear clean, loose clothing made of natural fibers. Sufferers should spend as much time as possible in cool conditions, and should avoid exercise in the heat.
Fungal infections	Conditions similar to "athlete's foot" are common in warm climates and can be more than usually painful and incapacitating. These fungal infections commonly affect the groin ("jock itch"), between the toes, and the armpits, causing great discomfort.	Maintain good personal hygiene and wear clean, loose clothing made of natural fibers. Use plenty of medicated talcum powder. If the infection is severe, specific medical treatment may be required.
Swimmer's ear	Swimmer's ear is an infective inflammation of the ear and external ear canal (<i>see page 179</i>). It can be very troublesome and difficult to cure.	Wear well-fitting ear plugs and take care to dry the ears thoroughly after swimming.

DRESSINGS AND BANDAGES

17

Applying dressings and bandages is an important part of good first-aid practice. Wounds usually require a dressing, and almost all injuries will benefit from the support that bandages can give.

Using first-aid materials

The materials that you need to equip a useful first-aid kit are shown on the next two pages. The dressing or bandage that you choose, and the technique for applying it, will depend upon the injury and materials that are available to you. Always use sterile first-aid equipment if it is available. However, if it is not, you can improvise using clean, everyday articles.

The following pages demonstrate the techniques required to apply each type of dressing and bandage; more detailed information about when to use each one is given on the pages dealing with specific injuries. If you wish to increase your proficiency in bandaging, it is well worth attending an approved first-aid course.

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DRESSINGS ARE USED TO:

- ◆ Help control bleeding.
- ◆ Cover a wound and protect it, thereby reducing the risk of infection.

BANDAGES ARE USED TO:

- ◆ Maintain direct pressure over a dressing to control bleeding.
- ◆ Hold dressings, splints, and compresses in place.
- ◆ Limit swelling.
- ◆ Provide support to an injured limb or joint.
- ◆ Restrict movement.

FIRST-AID MATERIALS

The materials necessary for first-aid are usually kept together in a first-aid kit or some other suitable container. First-aid kits should be kept in the workplace, at sports and leisure facilities, and in your home and car.

The contents of a kit for a workplace or leisure center must conform to legal requirements; they should also

be clearly marked and readily accessible. The contents of this standard kit should form the basis of your first-aid kit at home, although you may wish to add to it.

Any first-aid kit must be kept in a dry atmosphere, and checked and replenished regularly, so that the items you need are always ready to use.

DRESSINGS



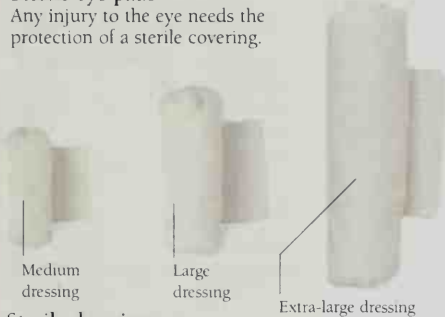
Adhesive dressings

Use for minor wounds. The waterproof types are the best choice for wounds on the hands.



Sterile eye pads

Any injury to the eye needs the protection of a sterile covering.



Sterile dressings

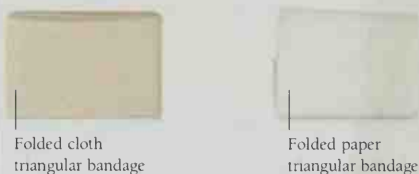
These are easy to apply, so they are ideal in an emergency. They come in a range of sizes and are sealed in a protective wrapping.

BANDAGES



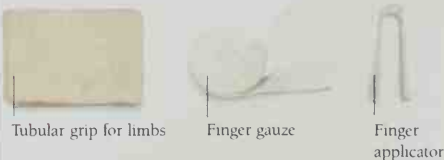
Roller bandages

Use these to give support to joints, secure dressings, restrict movement, maintain pressure on a dressing, or limit swelling.



Triangular bandages

Made of cloth or strong paper, these can be used as bandages and slings. If they are sterile and individually wrapped, they may be used as dressings for large wounds and burns.



Tubular bandages

Use these specially shaped bandages on joints and digits.

Basic materials for a first-aid kit

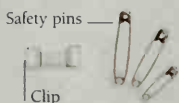
- ◆ Easily identifiable box; which needs to be watertight;
- ◆ 20 adhesive dressings in assorted sizes;
- ◆ six medium sterile dressings;
- ◆ two large sterile dressings;
- ◆ two extra-large sterile dressings;
- ◆ two sterile eye pads;
- ◆ six triangular bandages;
- ◆ six safety pins;
- ◆ disposable gloves.

Useful additions

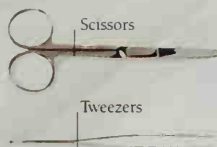
- ◆ two roller bandages;
- ◆ scissors;
- ◆ tweezers;
- ◆ cotton padding;
- ◆ nonalcoholic wound cleansing wipes;
- ◆ adhesive tape;
- ◆ notepad, pencil, and tags;
- ◆ pocket mask or plastic face shield;
- ◆ for outdoor activities: blanket, survival bag, flashlight, and whistle.

OTHER USEFUL ITEMS**Adhesive tape**

Use to fix bandages in place. Some people are allergic to the adhesive, so check before applying.

**Pins and clips**

Secure bandages or dressings with these.

**Scissors and tweezers**

Make sure scissors are blunt-ended so that they do not cause injury.

Wound cleansing wipes

Clean skin around small wounds or your hands with these, if water and soap are not available.

**Disposable gloves**

Wear gloves when dressing wounds or disposing of any waste materials.

Cotton padding

Never place this on a wound; use it as an absorbent outer layer, or as padding.

**Tags**

Use to label victims of major accidents.

**Blanket, flashlight, and whistle**

Add these to outdoor kits. The blanket can protect a person from cold and a whistle will help rescuers locate you.

**Gauze pads**

Use as dressings, for extra padding, or as swabs.

**Plastic face shield**

This can protect you when giving artificial respiration.

**Notepad and pencil**

Use to record details and your observations during treatment.

Survival bags

These keep people warm and dry.

DRESSINGS

Dressings cover a wound, prevent infection from entering it, and help the blood-clotting process. Although they may stick to a wound, the benefits outweigh any discomfort caused on removal.

Use a prepacked, sterile dressing where possible. If none is available, any clean, nonfluffy material can be used to improvise a dressing.

General rules for applying dressings

- ◆ The dressing pad should always extend well beyond the wound's edges.
- ◆ Place dressings directly on a wound.

Do not slide them on from the side.

- ◆ Replace any that slip out of place.

◆ If blood seeps through a dressing, do not remove it; instead, apply another dressing over the top.

- ◆ If there is only one sterile dressing, use this to cover the wound, and use other clean materials as top-

dressings.



PREVENTING CROSS-INFECTION

Follow the rules below to avoid passing infection to the injured person through an open wound, and to protect yourself.

- ◆ Wear disposable gloves, if available.
- ◆ Where possible, wash your hands thoroughly before dressing a wound.
- ◆ Cover cuts and abrasions on your hands with waterproof dressings.
- ◆ Avoid touching the wound, or any part of the dressing that will come into contact with the wound.
- ◆ Try not to talk, sneeze, or cough over a wound while you are treating it.

When gloves are unavailable, use one of the following options.

- ◆ Ask the person to dress his or her own wound under your supervision.
- ◆ Enclose your hands in clean plastic bags.
- ◆ Dress the wound, but wash your hands very thoroughly afterward.

Sharps container

Yellow containers for used needles are collected and disposed of safely by authorized waste collectors.



Dealing with waste

Clean up as soon as possible after treating a person. Always wear disposable gloves to perform these tasks.

- ◆ Use special chemical cleaner or a diluted solution of bleach (one teaspoonful bleach to one pint or 0.5 liter water) to mop up bodily fluids from the floor, other surfaces, or first-aid equipment.
- ◆ Put sharp items such as needles or syringes in containers for disposal.
- ◆ Place all soiled dressings and materials, including gloves, in a suitably marked plastic bag. Seal the bag and dispose of it safely.



Bagging waste

Wear disposable gloves while you are disposing of waste, even if the bag is sealed.

STERILE DRESSINGS

Sterile dressings are sterilized bandages sold in sealed packages. The one illustrated below consists of a dressing pad attached to a roller bandage. You can make

a similar bandage using separately packaged sterile pads and roller bandages. If the seal on a sterile dressing is broken, the dressing is no longer sterile.

METHOD

1 Remove the wrapping. Unwind the bandage's loose end, taking care not to drop the roll or touch the dressing pad.

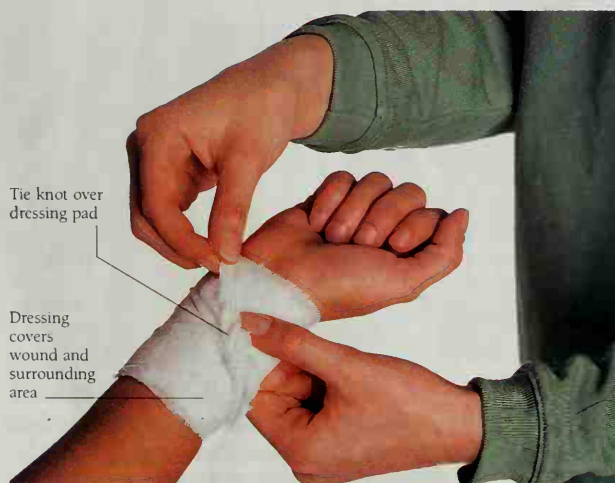
DO NOT bandage so tightly that the circulation is cut off.



2 Unfold the dressing pad, holding the bandage on each side of the pad. Put the pad directly onto the wound.

3 Wind the short end, or *tail*, of the bandage once around the limb and the dressing to secure the pad, then leave it hanging.

4 Wind the other end, or *head*, of the bandage around the limb to cover the whole pad, and leave the *tail* hanging free.



IF the dressing slips out of place, remove it and apply a new dressing.

5 To secure the bandage, tie the ends in a square knot (see page 230), tied over the pad to exert firm pressure on the wound.

IF bleeding appears through the dressing, do not remove it. Apply another dressing on top.

6 Check the circulation to the extremity of the injured limb (see page 223). Loosen bandage if needed.

GAUZE DRESSINGS

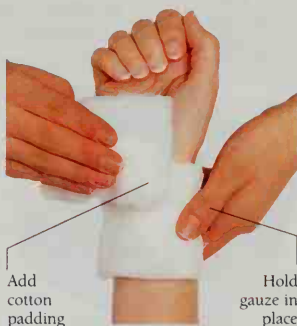
If a sterile dressing is not available, use a gauze pad. Made from layers of gauze, it forms a soft covering for wounds. Cover the gauze with cotton padding to absorb blood or discharge. Secure the dressing

with adhesive tape or a roller bandage if pressure is needed. Do not fully encircle a limb or digit with tape because it can impede circulation. If the person is allergic to adhesive tape, use a roller bandage.

METHOD



1 Holding the gauze pad by the edges, place it directly onto the wound.



2 Add a layer of cotton padding on top of the gauze dressing.



3 Secure with adhesive tape or with a roller bandage (see page 224).

IMPROVISED DRESSINGS

If a prepared dressing is not available, you can improvise with any clean material. Do not use fluffy materials

because the fibers may stick to and contaminate the wound. Freshly laundered cloths are best.

METHOD



1 Hold the material by the edges only. Open it out and refold so that the inner surface is outermost.



2 Place the pad of material directly onto the wound. If necessary, cover with more material.



3 Secure the pad with a bandage or a clean cloth strip. Tie the ends in a square knot (see page 230).

ADHESIVE DRESSINGS

These dressings are useful for small wounds. They consist of a gauze or cellulose pad with an adhesive backing. Adhesive dressings come in various sizes (some are specially shaped for fingertips,

heels, and elbows). Check that the person is not allergic to adhesive dressings before use. Food handlers must apply waterproof adhesive dressings to any wounds on their hands.

METHOD

- 1 Dry the surrounding area. Remove the wrapping and hold the dressing, pad-side down, by its protective strips.
- 2 Peel back, but do not remove, the protective strips. Without touching the pad, place it onto the wound.
- 3 Carefully pull away the protective strips. Press the ends and edges down.

Dressings stick best to dry skin



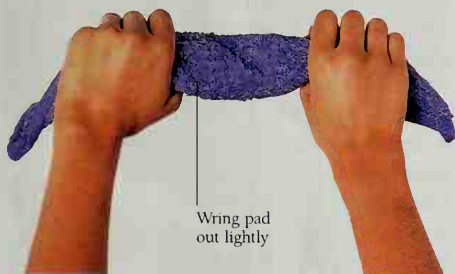
Hold dressing by its protective strips

COLD COMPRESSES

Cooling an injury such as a bruise or sprain can reduce swelling and pain, although it will not alter the severity of the underlying injury. You can use an ice pack or cold compress, or

place the injured part under cold running water or in a basin of cold water. A pack of frozen vegetables can also be used, but wrap it in a cloth before applying it to the skin.

APPLYING A COLD PAD

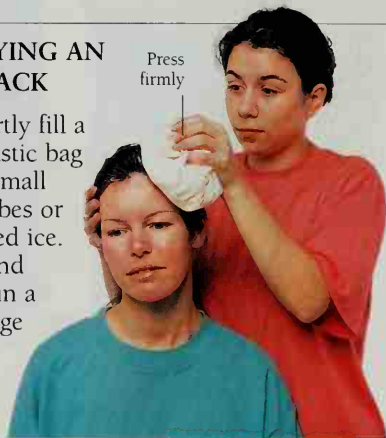


Wring pad out lightly

- 1 Soak a cloth or towel in cold water. Wring it out lightly and place the cold, damp pad firmly over the injury and surrounding area.
- 2 Resoak the pad in cold water every 3–5 minutes to keep it cold. Cool the injury for at least 20 minutes.

APPLYING AN ICE PACK

- 1 Partly fill a plastic bag with small ice cubes or crushed ice. Seal and wrap in a bandage or a cloth.



Press firmly

- 2 Hold the ice pack firmly in place over the injury.
- 3 Cool the injury for 10–15 minutes only, replacing the ice as necessary.

BANDAGES

Bandages have a number of purposes: they are used to hold dressings in position over wounds, to control bleeding, to support and immobilize injuries, and to reduce swelling. There are three main types of bandage:

- ◆ *roller bandages*, which secure dressings and can give support to injured limbs;

- ◆ *tubular bandages*, which can secure dressings on fingers or toes or support injured joints;

- ◆ *triangular bandages*, which are usually made of cloth; they are used as slings or large dressings, to secure dressings, and to immobilize limbs.

In an emergency, you may have to improvise bandages from everyday items (see pages 220 and 234).

GENERAL RULES FOR BANDAGING

Before applying bandages

- ◆ Reassure the injured and explain clearly what you are going to do.

Ask person to support injured part

Make sure he is seated comfortably



Work from injured side

- ◆ Make the person comfortable, in a suitable position, sitting or lying.
- ◆ Keep the injured part supported; the person or an assistant may do this.
- ◆ Always work in front of the person, and from the injured side where possible.

When applying bandages



- ◆ If the person is lying down, pass the bandages under the body's natural hollows at the ankles, knees, waist, and neck. Then slide the bandages into position by easing them back and forth under the body. To bandage the head or upper torso, pull a bandage through the hollow under the neck, and slide into place.



- ◆ Apply bandages firmly, but not so tightly as to cut off circulation to the extremities (see *opposite*).
- ◆ Leave fingers and toes on a bandaged limb exposed, if possible, so that you can check the circulation afterward.
- ◆ Tie bandages with square knots. Ensure that the knots do not cause discomfort and do not tie the knot over a bony area. Tuck loose ends under a knot if possible.
- ◆ Regularly check the circulation to the extremity of a bandaged limb (see *opposite*). Loosen the bandages if necessary.

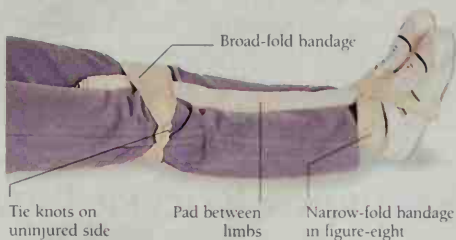
When bandaging to immobilize a limb

- ◆ Place some soft, bulky padding, such as towels or folded clothing, between an arm and the body, or between the legs so that the bandaging does not displace any broken bones.
- ◆ Bandage around the limb at intervals, avoiding the injury as much as possible.
- ◆ Tie the knots on the uninjured side toward the upper part of the body. If both sides are injured, tie knots in the middle of the body or where there is least chance of causing further damage.

After applying bandages

- ◆ Check the circulation in a bandaged limb every ten minutes (*see below*).

IMMOBILIZING A LEG WITH BANDAGES



CHECKING THE CIRCULATION

You must check the circulation in a hand or foot immediately after bandaging a limb or using a sling, and again every ten minutes until medical aid arrives.

Rechecking the circulation is vital because limbs swell following an injury, and a bandage can quickly become too tight and cut off the circulation. The symptoms will change, as first the veins in the limb, and then the arteries supplying the limb, become impeded.

Recognition of impaired circulation

Initially, there may be:

- ◆ A swollen and congested limb.
- ◆ Blue skin with prominent veins.
- ◆ A feeling of painful distension.

Later, there may be:

- ◆ Pale, waxy skin and cold numbness.
- ◆ Tingling, followed by deep pain.
- ◆ Inability to move fingers or toes.

METHOD



1 Press one of the nails (*see inset*), or the skin of the hand or foot, until it is pale. If, on releasing the pressure, the color does not return, or returns slowly, the bandage may be too tight.



2 Loosen tight bandages by unrolling just enough turns for warmth and color to return to the extremity. The person may feel a tingling sensation. Reapply the bandage as necessary.

ROLLER BANDAGES

These are made of cotton, gauze, or linen, and are applied in spiral turns. There are three principal types:

- ♦ *open-weave bandages*, which are used to hold light dressings in place; because of their loose weave, they allow good ventilation, but cannot be

used to exert pressure on the wound or to give support to joints;

- ♦ *conforming bandages*, which mould to the body shape, are used to secure dressings and lightly support injuries;

- ♦ *tensor bandages*, which are used to give firm support to joints.

SECURING ROLLER BANDAGES

There are several ways to fasten a roller bandage; specialized clips, safety pins, or adhesive tape may all be found in first-

aid kits. If you do not have any of these, a simple tuck should keep the *tail* of the bandage neatly in place.



Adhesive tape

The ends of bandages can be stuck down with small strips of adhesive tape.



Bandage clips

These are sometimes supplied with elasticized roller bandages.

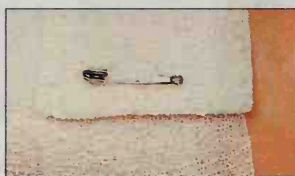


Tucking in the end

After applying a roller bandage (*see opposite*), leave enough of the end free to allow it to pass around the limb once, and tuck it in.

Safety pins

These can secure all types of roller bandage (*bottom*). Insert your finger between bandage and skin (*top*) to prevent injury as you secure the pin.



CHOOSING THE CORRECT SIZE OF BANDAGE

Before applying a roller bandage, make sure that it is tightly rolled and of a suitable width. Different parts of the body require different widths of roller bandage. Remember that it is better for a bandage to be too wide than too narrow, so make sure that you choose an appropriate size. The roller bandages shown here are the recommended sizes for an adult.

Finger

1 in (2.5 cm) _____

Hand

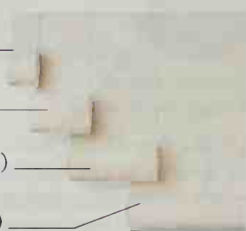
2 in (5 cm) _____

Arm

3–4 in (7.5–10 cm) _____

Leg

4–6 in (10–15 cm) _____



APPLYING A ROLLER BANDAGE

Follow these general rules when you are applying a roller bandage.

- ◆ When the bandage is partly unrolled, the roll is called the “head,” and the unrolled part, the “tail.” Keep the *head* of the bandage uppermost when bandaging.
- ◆ Position yourself toward the front of the victim at the injured side.

◆ While you are working, support the injured part in the position in which it will remain after bandaging.

◆ Check the circulation (*see page 223*) beyond a bandage, especially when using conforming and elasticized bandages; these mold to the shape of the limb, and may become tighter if the limb swells.

METHOD



1 Place the *tail* of the bandage below the injury and, working from the inside of the limb outward, make two straight turns with the *head* of the bandage to anchor it in place.



3 Finish off with one straight turn, and secure the end (*see opposite*).

IF the bandage is too short, apply another one in the same way to extend it.



2 Make a series of spiraling turns, winding from the inside to the outside of the limb and working up the limb. Make sure that each turn covers between one-half and two-thirds of the previous layer of bandaging.



4 Regularly check the circulation to the extremity of the injured limb (*see page 223*).

IF the bandage is too tight, partially undo it, and reapply it more loosely.

ELBOW AND KNEE BANDAGE

Roller bandages can be used on elbows and knees to hold dressings in place or to support soft tissue injuries, such as strains or sprains. They are not effective for this purpose if applied with the standard

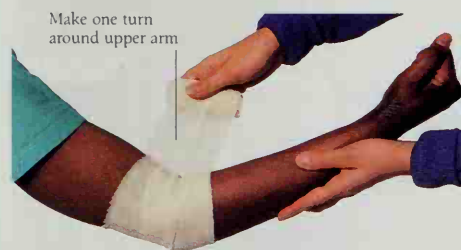
spiraling turns, so use the method shown below for elbows and knees. Always make sure that you bandage sufficiently far on either side of the injured joint to exert an even pressure.

METHOD

1 Support the injured arm in a comfortable position, with the joint partly flexed if possible.

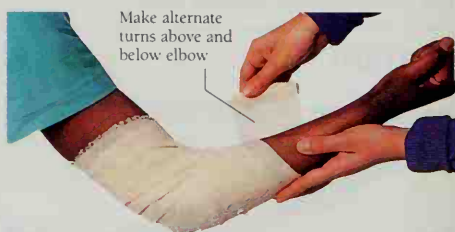


2 Place the *tail* of the bandage on the inside of the elbow. Pass the bandage under and around to the outside of the elbow one-and-a-half times, so that the bandage is fixed, covering the elbow joint.



3 Pass the bandage around the elbow joint to the inner side of the upper arm. Make a diagonal turn around the upper arm, covering the upper half of the bandage from the first turn.

4 Take the bandage from the inner side of the upper arm to just below the elbow joint. Make one diagonal turn around the forearm, to cover the lower half of the bandage from the first straight turn.



5 Continue to bandage diagonally above and below the joint in a figure-eight, steadily extending the bandaging by covering approximately two-thirds of the previous layer each time.

DO NOT bandage so tightly that the circulation is cut off.



6 Make two straight turns to finish off, and secure the end (see page 224).

7 Check the circulation to the fingers or the toes every ten minutes (see page 223). This is particularly important with this type of bandaging.

IF the bandage is too tight, undo it until the blood supply to the hand or foot returns. Reapply the bandage less tightly.

HAND AND FOOT BANDAGE

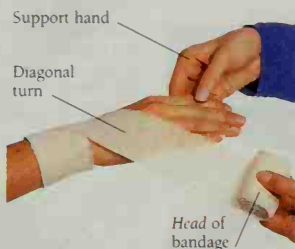
A roller bandage may be used to hold dressings in place on the hand or foot, or to provide support to wrists or ankles that have been sprained or strained. Support bandaging should extend well

beyond the joint to provide pressure over the injured area. The method shown below for bandaging a hand can be used on a foot, substituting the big toe as the thumb and leaving the heel unbandaged.

METHOD



1 Place the *tail* of the bandage on the inside of the wrist, by the base of the thumb. Make two straight turns over and around the wrist.

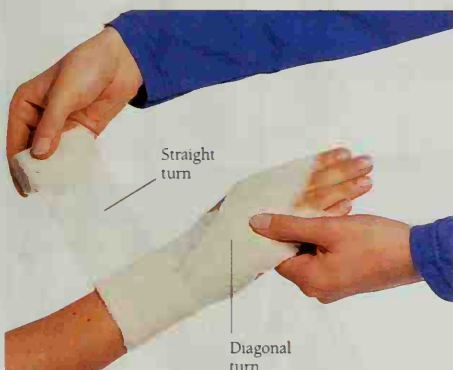


2 From the thumb side of the wrist, take the bandage diagonally across the back of the hand, so that the top edge touches the nail of the little finger.



3 Take the bandage under and across the fingers so that the upper edge of the bandage touches the base of the nail of the index finger.

4 Take the bandage diagonally across the back of the hand to the outer side of the wrist, then around the wrist and up.



5 Repeat the sequence of turns, covering two-thirds of the bandage from the previous turn each time. Leave the thumb free. When the hand is covered, make two straight turns around the wrist.



On a bandaged foot, check the circulation in the toes.



6 Secure the bandage with either a safety pin or clip (see page 224). Regularly check the circulation in the fingers (see page 223). Loosen the bandage if necessary.

TUBULAR GAUZE

This is a tubular bandage made from a roll of seamless gauze, which is used to support joints such as the elbow or ankle. A small tubular gauze can be applied to a finger or toe with a

special applicator, supplied with each roll. A tubular gauze is useful for holding light dressings in place, but it cannot exert enough pressure to control the bleeding from a wound.

METHOD

Support injured person's hand



1 Cut a piece of tubular gauze two-and-a-half times the length of the injured finger. Push the whole length on to the applicator. Gently slide the applicator over the injured finger.



Twist seals bandage

Hold applicator just beyond fingertip

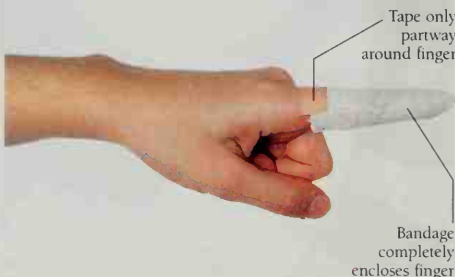
2 Holding the end of the gauze on the finger, pull the applicator slightly beyond the fingertip to leave a gauze layer on the finger. Twist the applicator twice.

Keep holding end of gauze in place on base of finger



Push applicator back toward hand

3 While still holding the gauze firmly at the base of the finger, gently push the applicator back over the finger until the finger is covered with the second layer of gauze tubular bandage. Remove the applicator from the finger.



Tape only partway around finger

Bandage completely encloses finger

4 Secure the tubular bandage at the base of the finger with adhesive tape. Do not encircle the finger with tape, which may impede circulation. Regularly check the circulation to the finger (see page 223). Reapply the tape if needed.

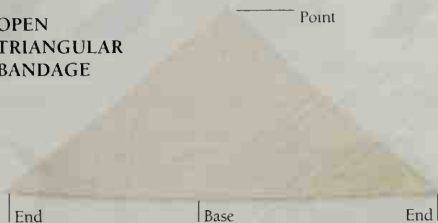
TRIANGULAR BANDAGES

Sold in sterile packs, these bandages can also be made by cutting or folding 10 square feet (1 square meter) of sturdy fabric (such as linen or calico) diagonally in half. They can be used:

- ♦ folded into broad-fold bandages (see below, right) to immobilize and support limbs and secure splints and bulky dressings;

- ♦ folded into narrow-fold bandages (see below), to immobilize feet and ankles, and hold dressings in place;
- ♦ straight from a pack and folded into a pad to form a sterile improvised dressing pad;
- ♦ open, as slings to support an injured limb, or to hold a hand, foot, or scalp dressing in position.

OPEN
TRIANGULAR
BANDAGE



STORING A TRIANGULAR BANDAGE

Store triangular bandages in their packs, or in the way shown below so that, in an emergency, they are either ready-folded for use or can simply be shaken open.

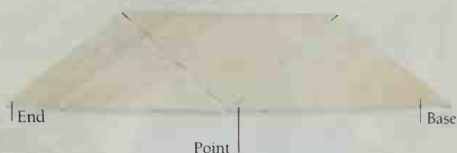


1 Start with a narrow-fold bandage (see right). Bring the two ends of the bandage into the center.



2 Keep folding the ends into the center until a convenient size is reached. Keep the bandage in a dry place.

MAKING A BROAD-FOLD BANDAGE



1 Open out a triangular bandage and lay it flat on a clean surface. Fold it horizontally so that the *point* touches the center of the *base*.



2 Fold the triangular bandage in half again in the same direction. This completes the broad-fold bandage.

MAKING A NARROW-FOLD BANDAGE



1 Fold a triangular bandage to make a broad-fold bandage (see above).



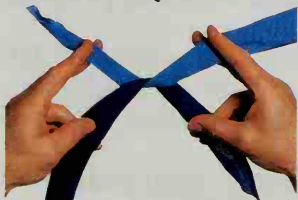
2 Fold the bandage horizontally in half again to make a thick, but long and narrow, bandage.

SQUARE KNOTS

When tying a bandage, always use a square knot. It lies flat so it is more comfortable for the injured; it is secure

and will not slip, but is easy to untie. Avoid tying the knot around or over the injury itself as this may cause discomfort.

TYING A SQUARE KNOT



1 Pass the left end (*dark*) over and under the right.



3 Pass the right end (*dark*) over and under the left.



2 Bring both ends up again.



4 Pull the ends firmly to tighten; tuck in ends.

UNTYING A KNOT



1 Pull one end and one piece of bandage apart.



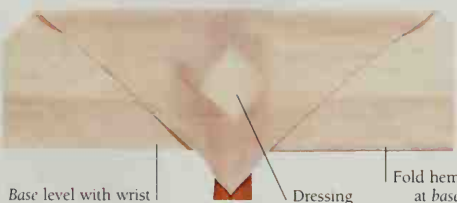
2 Hold the knot; pull the end through it and out.

HAND AND FOOT COVER BANDAGE

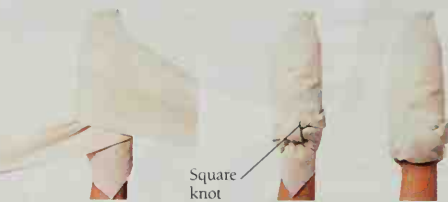
An open triangular bandage on a hand or foot will not exert enough pressure to control bleeding, but is useful for holding

a dressing in place. This method for bandaging a hand can also be applied to a foot; tie the ends around the ankle.

METHOD



1 Lay the bandage flat and place the injured's hand on it, fingers toward the *point*. Place the dressing on the wound. Fold the *point* of the bandage over the hand, bringing it to the forearm.



2 Pass the ends around the wrist in opposite directions. Tie a square knot over the *point* and pull the *point* gently to tighten the bandage over the dressing. Fold the *point* over the knot and tuck it in.

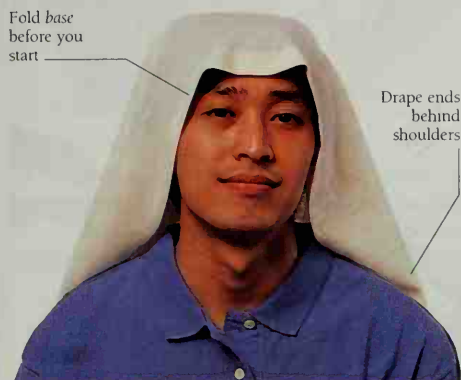
SCALP BANDAGE

An open triangular bandage may be used to hold a dressing in position on the top of a person's head, although it cannot provide enough pressure to control profuse bleeding. A dressing on

a bleeding scalp wound should be held in position with a roller bandage (see pages 90 and 224). If possible, sit the person down because this makes it easier to apply the scalp bandage.

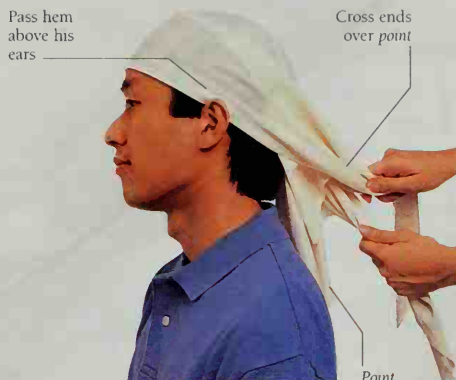
METHOD

Fold base
before you
start



Drape ends
behind
shoulders

Pass hem
above his
ears

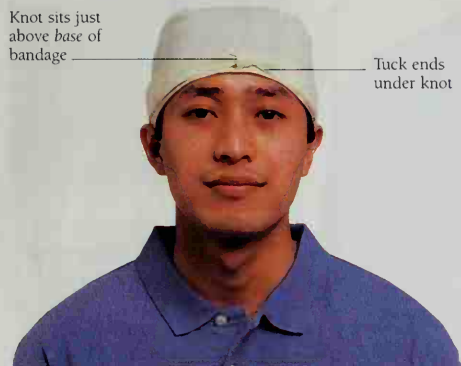


Cross ends
over point

Point

1 Fold a hem along the *base* of the bandage. Place the bandage on the person's head with the center of the *base* just above his eyebrows. Let the *point* hang down at the back of his head.

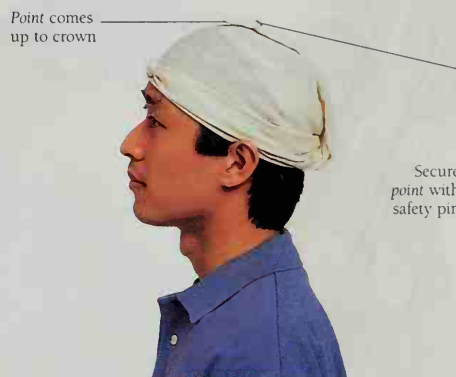
Knot sits just
above base of
bandage



Tuck ends
under knot

2 Bring the two ends around the person's head, with the hem just above his ears, to the back of his head. Cross the two ends at the nape of his neck over the *point* of the bandage.

Point comes
up to crown



Secure
point with
safety pin

3 Bring the two ends of the bandage around to the front of the injured person's head. Use a square knot (see *opposite*) to tie the ends together, at the center of the person's forehead and close to the *base* of the bandage.

4 Steadying his head with one hand, draw the *point* down to tighten the bandage; take the *point* up towards the top of his head; secure with a safety pin. If you have no pin, fold the *point* over the crossed ends at the back and tuck in.

SLINGS

Slings are used to support the arm of a person who is sitting or is able to walk. There are two types of sling:

♦ *arm sling*, which supports the arm with the forearm horizontal or slightly raised, used for an injured upper arm, wrist, or forearm, or a simple rib fracture;

♦ *elevation sling*, which supports the upper limb with the hand in a well-raised position. It is used for some fractures, to help control bleeding from wounds in the forearm, to reduce swelling in burn injuries, and for complicated rib fractures.

APPLYING AN ARM SLING

1 Support the injured arm so that its hand is above the uninjured elbow. Pass one end of the bandage through at the injured elbow and pull to the opposite shoulder. Spread the bandage out so that the base is level with her little finger nail.



2 Bring the lower end of the bandage up over her forearm to meet the other end at her shoulder.



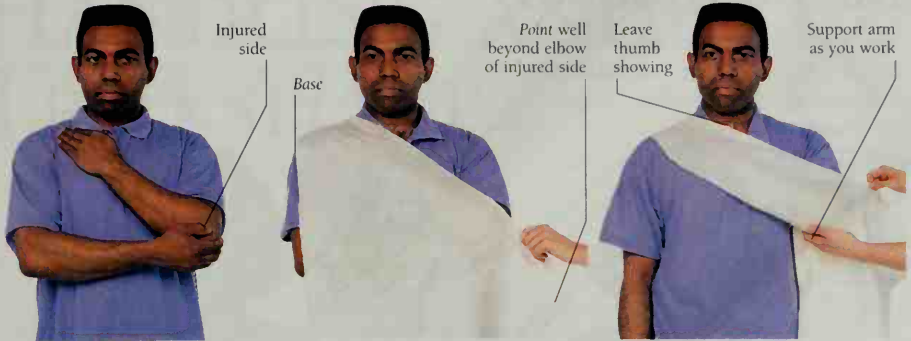
IF you do not have a safety pin, twist the *point* until the sling fits her elbow snugly, then tuck it into the sling at the back of her arm.

3 Tie a square knot (see page 230) at the hollow over her collar bone on the injured side. Tuck both ends of the bandage under the knot to pad it.

4 Fold the *point* forward at her elbow. Tuck any loose bandage underneath it, and secure the *point* to the front of the bandage with a safety pin.

5 Regularly check the circulation in her exposed fingers (see page 223). If necessary, undo the sling and loosen any underlying bandages.

APPLYING AN ELEVATION SLING



1 Ask the person to support the injured arm across his chest, with his fingertips touching the opposite shoulder.

2 Drape one end of a triangular bandage over his shoulder on the uninjured side, with the *point* on his injured side.

3 Ask the person to release his arm. Tuck the *base* of the bandage under his hand and forearm and behind his elbow.



Watch thumb for signs of impaired circulation



IF you have a pin, fold any loose bandage over the *point*, and fasten at the corner.

4 Bring the lower end up diagonally across his back to meet the other end at his shoulder.



5 Tie the ends in a square knot (see page 230) at the hollow above his collar bone. Tuck ends under the knot to pad it.

6 Twist the *point* until the bandage fits snugly around his elbow. Tuck the *point* into the sling at his elbow to secure it.

7 Regularly check the circulation in his thumb (see page 223). If necessary, undo the sling and loosen any bandages.



IMPROVISED SLINGS

You can improvise a sling (see pages 232–33) with a square of cloth. Make sure it is sturdy and large enough to support the

arm. You can also improvise slings from items of clothing, or adjust the person's clothes to support an injured arm.

METHODS

Jacket

Injured arm is secured in jacket fold

Leave fingers exposed to check circulation



◆ Undo the jacket and turn the hem up and over the injured arm. Pin the hem to the jacket breast with a large safety pin.

Long-sleeved shirt

Pin must be sturdy enough to take weight of arm



◆ If the person is wearing long sleeves, pin the cuff of the sleeve of the injured arm to the opposite front of her shirt or jacket, as shown above. For an improvised elevation sling, pin the sleeve further up at her shoulder to raise her arm.

Button-up jacket

Jacket button supports wrist



◆ Undo a button of a jacket, coat, or waistcoat and place the hand of the injured arm inside the fastening.

Short-sleeved shirt

Twist belt once so hand cannot slip out

Make sure blood flow to hand is not impeded



◆ Use a belt, tie, or a pair of suspenders or panty hose to make a “collar-and-cuff” support.

DO NOT use this method if you suspect that the forearm is broken.

HANDLING AND TRANSPORT 18

When moving an injured person, it is very important to be aware of the possible dangers to yourself and to the injured. Incorrect handling and transport methods could aggravate the condition and cause you to injure yourself. You should not move anyone unless you have received comprehensive training, or the person is in imminent danger and it is safe for you to approach him or her.

Safety guidelines and training

This chapter demonstrates the safe methods of moving or handling an injured person, including advice on the different types of stretcher, and how to use them when it is necessary to transport the injured person.

However, the advice given in this chapter is *not* a substitute for training. Comprehensive instruction can only be given on a practical first-aid training course.

HANDLING AND TRANSPORT RULES

- ◆ Move an injured person only if it is absolutely necessary, and you are not putting yourself in danger.
- ◆ Always explain to the injured person what is happening, so that he or she can cooperate fully.
- ◆ Do not try to move an injured person by yourself if help is available. Ensure that helpers understand what they should do, so that they can cooperate fully.
- ◆ When more than one First Aider is moving an injured person, appoint someone to give commands.
- ◆ Always use the correct lifting technique (*see page 236*) to avoid injuring your back when lifting or carrying an injured person.

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MANUAL MOVES

You can be at risk of injury when moving someone, so it is important to plan each step before you begin. The method you choose to remove a someone from immediate danger will depend on the situation, the person's condition, and whether there is any help available (*see below*).

If there are several helpers, it is important to appoint a team leader to coordinate the maneuver. Once this has been decided, consider and discuss the risks involved as a team.

- ◆ *The task:* is it really necessary? Can the injured person move himself? Is it possible to get help? Is there any equipment available?
- ◆ *The load:* how heavy is the injured person? What are his injuries and will the move aggravate them?
- ◆ *The environment:* have you made enough space for your move? What sort of ground will you be crossing? Do you have everything you need?
- ◆ *The handlers:* are you and any team members properly trained?

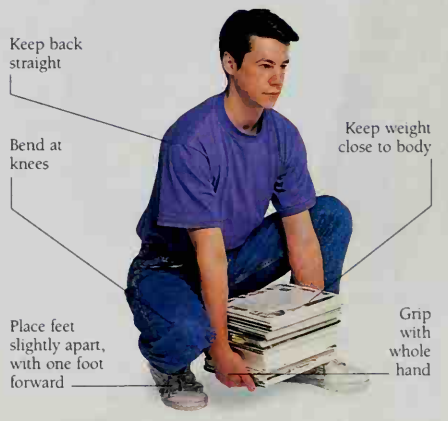
LIFTS AND CARRIES FOR ONE AND TWO FIRST AIDERS

<i>Condition of injured</i>	<i>One First Aider</i>	<i>Two First Aiders</i>
Conscious, able to walk	• Human crutch method	• Human crutch method
Conscious, unable to walk	• Piggyback or cradle method (lightweight people only) • Drag method (may aggravate shoulder, head, or neck injuries)	• Two-handed seat • Fore-and-aft carry (not for victims with arm, shoulder, or rib injuries)
Unconscious	• Cradle method (lightweight people only) • Drag method (<i>see above</i>)	• Fore-and-aft carry (<i>see above</i>)

LIFTING SAFELY

If you lift and lower someone correctly, you are less likely to harm them or yourself. Always use your strongest muscles (those at the thigh, hip, and shoulder) and follow these rules:

- ◆ think before you lift;
- ◆ stand as close as possible to the person or lifting aid;
- ◆ bend your knees;
- ◆ keep your back straight, but not rigid;
- ◆ use your legs to provide the power that you need for the lift;
- ◆ move smoothly, holding the person or the lifting aid as close to you as possible.



CARRIES FOR ONE FIRST AIDER

If no help is available, encourage an injured person to walk with a little help from you or a walking aid. If you are by yourself, you should only attempt to

move someone in an emergency, when the person is in real danger. Only use the cradle and piggyback methods for lightweight people, such as children.

HUMAN CRUTCH METHOD

IF possible, give the injured person a walking stick for extra support.

1 Stand on his injured or weaker side. Place his arm around your neck, and grasp his hand or wrist with your hand.

2 Pass your other arm around his waist. Grasp his clothes to support him.

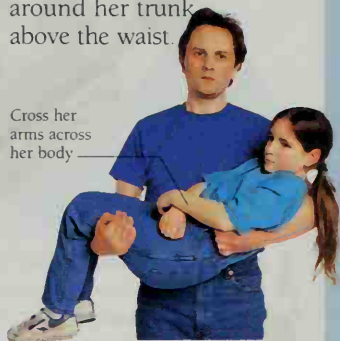
3 Move off with your inside foot. Take small steps, and walk at the injured person's pace. Reassure him throughout.



CRADLE METHOD

1 Squat beside the person. Pass one of your arms around her trunk above the waist.

Cross her arms across her body



2 Pass your other arm under her thighs. Stand, hugging her toward you.

DRAG METHOD

1 Crouch behind the injured person, help her to sit up, and cross her arms over her chest.

DO NOT use this method if there are shoulder, head, or neck injuries.

Grasp her wrists firmly

Keep back straight



2 Pass your arms under the injured person's armpits and grasp her wrists. Carefully pull her backward and squat walk.

IF she is wearing a jacket, unbutton it and pull it up under her head. Grasp the jacket under the shoulders, and pull her backward.

PIGGYBACK METHOD

1 Crouch in front of the person, with your back to her. Ask her to put her arms over your shoulders, and, if possible, grasp her own hands.

She must be able to hold on



2 Grasp the thighs and rise slowly, keeping your back straight.

CARRIES FOR TWO FIRST AIDERS

It is easier to control a move with two First Aiders. However, such a carry must still be undertaken with extreme caution, and only in an emergency. Use the

two-handed seat to move injured people who are conscious. Only use the fore-and-aft carry to move someone onto a stretcher or a carry chair (*see opposite*).

THE TWO-HANDED SEAT

Squat down



1 Squat facing each other on either side of the person to be carried. Cross arms behind her back and grasp her waistband.



2 Pass your other hands under the person's knees, and grasp each other's wrists. Bring your linked arms up to the middle of the person's thighs.



3 Move in close to the person. Keeping your backs straight, rise slowly, and move off together.

THE FORE-AND-AFT CARRY

DO NOT use this method if the arms, shoulders, or ribs are injured.

1 Sit the person up and put her arms across her chest.



2 Squat behind the person. Slide your arms under her armpits and firmly grasp her wrists.

Squat beside her and grasp her thighs



3 Ask your partner to squat beside the person and pass his arms under her thighs, taking hold of her legs.

4 Working together, keeping your backs straight, rise slowly, and move off.

MOVES USING EQUIPMENT

You should obtain proper and adequate training before attempting to move someone using specialized equipment. The information given in this section will familiarize you with the type of aids available and give you a basic guide to their use. Full instruction on how to use such

equipment is given during first-aid training courses and laid out in EMS training manuals.

You should not attempt to improvise moving aids, or to lift patients in equipment not designed for lifting, such as wheelchairs, except in an emergency.

CARRY CHAIRS

These chairs are kept in many schools, stores, and workplaces, and are used for moving people along passages and up or down stairs. A carry chair should be carried; wheel it only if you have to move the person on your own. Test any carry

chair before use to ensure that it will support the person's weight. As with all mobile aids, using a carry chair is not without dangers, and the safety guidelines (*see below and page 218*) should always be followed.

BEFORE MOVING

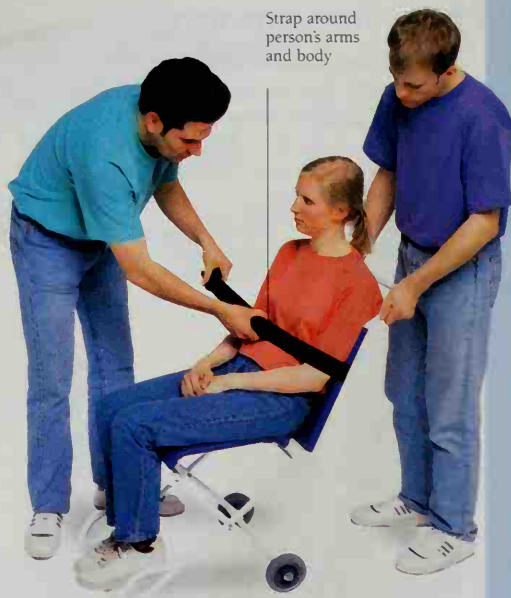
1 Unfold the chair, following the manufacturer's instructions, if available. Test the chair by pushing down on the seat, to check that it can support the person's weight.

Unfold and test chair



2 Ensure that the canvas seat and back are not showing signs of wear and tear, the wheels move freely, the safety strap is secure, and that there are no signs of any other damage.

Strap around person's arms and body



3 Sit the injured person in the chair. Secure the safety strap over her arms and put her feet on the footbar. One person should always support the back of the chair to stop it from tipping back.

MOVING AN INJURED PERSON

ALONG SMOOTH GROUND ON YOUR OWN

1 Reassure the injured person and explain what is going to happen. Make sure that she is strapped in properly.

2 Tip the chair back gently. Push it forward carefully, ensuring that you maintain a steady speed.

3 Make sure you take corners widely to prevent the chair from tipping over.

DO NOT pull the chair. This could cause both the chair and the injured person to fall forward onto you.

IF you come across any immovable objects, treat them as steps and alter your method accordingly (*see below*).



DOWN STEPS WITH HELP

1 Standing behind the chair, face it towards the top of the steps. Your partner should stand a few steps down, facing the front of the chair.



2 Tip the chair back; push it forward so that the wheels are on the edge of the steps. Ask your partner to squat down and grasp the handles on the footrest.



3 Your partner at the foot end controls the lift. When he commands, you should both pick up the chair, with your partner straightening his legs as he lifts.

4 Although your partner controls the pace, you will need to direct him.

IF you need a rest in mid-lift, use a landing rather than the steps.

IF going up steps, reverse the procedure.

STRETCHERS

These are used to carry people (see page 248) to an ambulance or to shelter. The robust standard stretcher is found at many recreation areas, schools, and workplaces. The lighter canvas-and-poles stretcher (see page 243) is used to lift someone onto a stronger stretcher. Orthopedic stretchers (see page 244) may be easier to use in some cases.

General rules for stretchers

- ♦ Always test stretchers regularly for wear and tear, and make sure that they can support a person's weight.
- ♦ When loading a stretcher, explain to the victim what is happening.
- ♦ Always ensure that an unconscious person, or one who needs to be transported any distance, is securely strapped onto the stretcher.

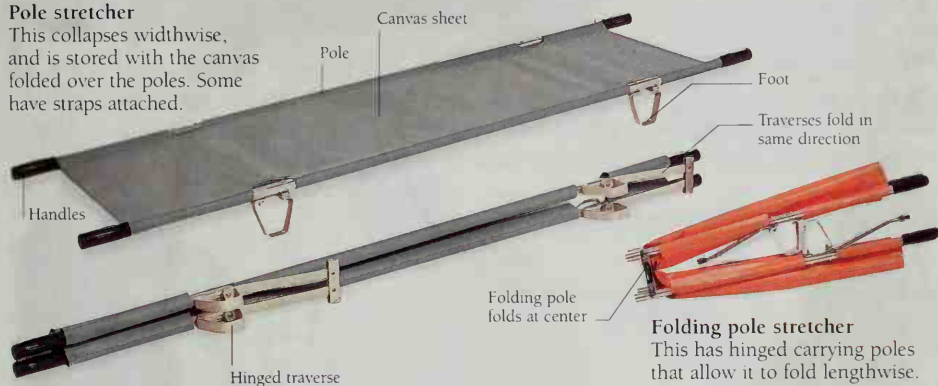
STANDARD STRETCHERS

The pole stretcher and the folding pole stretcher are first-aid stretchers. The pole stretcher consists of a canvas or plastic sheet attached to two carrying poles with

feet underneath. Hinged cross bars, or traverses, keep the stretcher open. The folding pole is similar to the pole, but is lighter and more compact when folded.

Pole stretcher

This collapses widthwise, and is stored with the canvas folded over the poles. Some have straps attached.

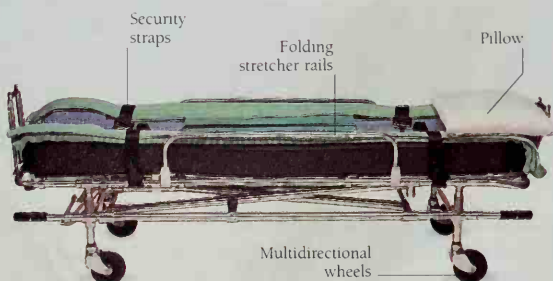


Folding pole stretcher

This has hinged carrying poles that allow it to fold lengthwise.

AMBULANCE STRETCHER

The stretcher shown to the right is commonly used only by trained personnel. The collapsible stretcher is usually carried in an ambulance and can be secured in the back of a moving vehicle. It is fully adjustable, from a flat to a chairlike position, to suit the patient. The height of the stretcher is also adjustable to facilitate transfers from the stretcher to a hospital bed.



OPENING A POLE STRETCHER



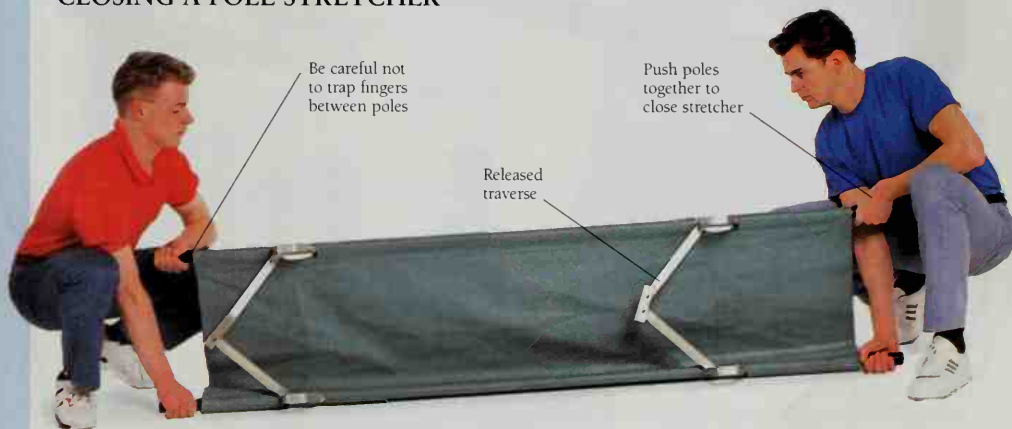
1 Place the stretcher on its side, undo any straps, and pull it open.

2 Push the outward-facing traverse open with the sole of your foot.

3 Stand the stretcher on its end, and press the other traverse open.

IF both traverses are inward-facing, open both with the stretcher upright.

CLOSING A POLE STRETCHER



1 Release both traverses. To do this, place the stretcher on its side, press the sole of your foot against the hinge of each traverse until it releases.

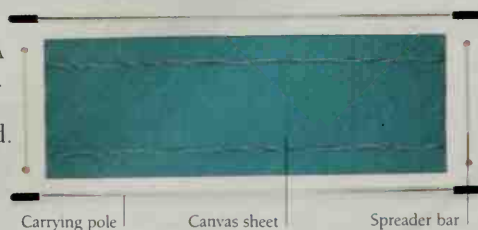
2 Bring the two poles together, making sure that the canvas is clear of them. Fold the canvas neatly over the poles, securing it with straps, if there are any.

CANVAS-AND-POLES STRETCHER

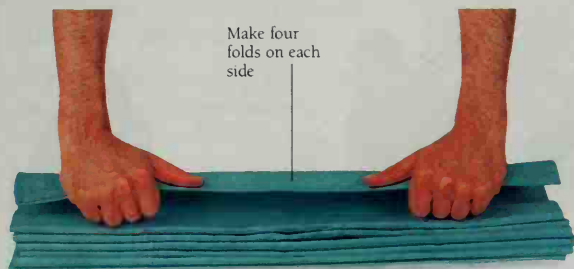
This is used as a stretcher or to load someone onto an ambulance stretcher. A strong canvas sheet supports the person. Poles are inserted to move the stretcher. Spreader bars either end ensure it is rigid.

See also:

Loading a Stretcher, page 247.



METHOD



1 Accordion— fold the top and bottom ends of the canvas in toward the center.

Hold center down and pull top end to head



3 Pull the other half of the canvas upward and under her head.

4 Slide the poles through the sleeves at the sides of the canvas.



2 With one person working on each side of the victim to be carried, pull the top part of the canvas up to the victim's head.

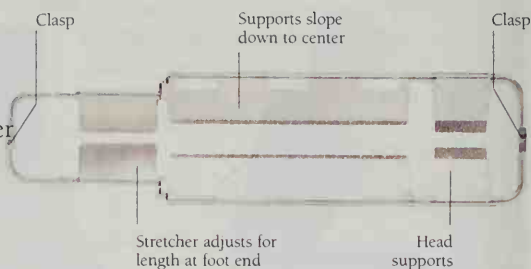


5 Fit the spreader bars over the ends of the poles for rigidity.

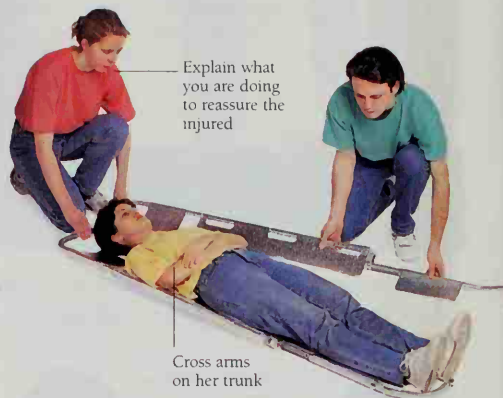


ORTHOPEDIC STRETCHER

This "scoop" stretcher is used to lift someone who must be moved in the position in which he or she is found. The stretcher splits lengthwise into two halves, which are placed on either side of the person, then reassembled. It should only be used by trained medical personnel.



METHOD



1 Place the stretcher alongside the injured. Adjust it so that it is longer than the injured person at both ends.

2 Uncouple the ends of the stretcher, and ease one half, and then the other, under each side of the person.



3 Rejoin the stretcher at the head end, while your helper holds the two halves at the foot end firmly in line.

4 Join the foot ends firmly. Your helper should apply a gentle traction at the waist to avoid catching the skin between the blades.

5 Lifting from the ends only, carefully place the scoop onto a stretcher. Undo the scoop and ease it away.

PREPARING A STRETCHER

Blanketing a stretcher will help keep the injured person warm and will protect him or her against any bumps and jolts. One blanket will suffice (*see below*), although two are better (*see page 246*). A

canvas carrying sheet may be placed beneath the injured person, so that he or she can be more easily transferred to another stretcher (*see page 241*), if this should prove necessary.

USING ONE BLANKET

1 Place the open blanket diagonally over the stretcher so that the corners overhang at the sides, top, and bottom.

2 Lay the person in the center of the stretcher (*see page 247*). Explain what you are going to do. Bring the foot overhang over her feet and tuck it around her ankles.



Reassure her as you tuck her in



Leave face exposed to let her breathe freely



3 Bring one side of the blanket over the injured person and tuck it in securely underneath her body.

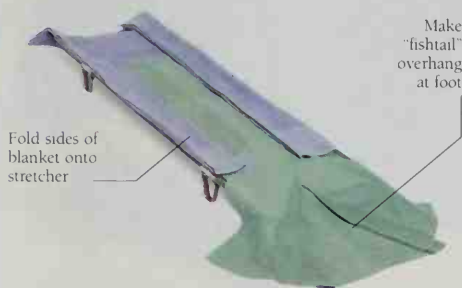
4 Fold the other side of the blanket over and tuck it in. Reassure her as you do this.

5 Tuck the overhang at the head end around her head and neck, leaving her face exposed.

IF the person is unconscious, or you need to transport her over any distance, ensure that she is strapped in securely.

PREPARING A STRETCHER USING TWO BLANKETS

1 Place the first blanket widthwise across the stretcher so that one side of the blanket covers the handles at the head end. Center the blanket on the stretcher.



2 Fold the second blanket lengthwise into three, and lay it along the stretcher, leaving a two-foot overhang at the foot end. Open out the edges of this overhang diagonally. Accordion-fold the edges of the first blanket onto the sides of the stretcher.



3 Place the person on the stretcher (see opposite). Bring the "fishtailed" overhang up over the feet, and tuck it in around her legs.



4 Bring one side of the blanket over and tuck it in. Repeat with the other side.



5 Tuck the overhang at the head end around the person's head and neck.

MAKING A BLANKET ROLL

Prepare a stretcher for storage with two blankets, and roll them up, starting at the foot end.

Always make sure that the roll is stored in a dry place.



LOADING A STRETCHER

The standard way to load a stretcher is to use a canvas-and-poles stretcher (see page 243), if available. If not, you can use the blanket lift (see below). Once the person has been lifted, she can be lowered onto a stretcher placed either

at her feet, or beneath her. If you do not have a blanket, or if there are fewer than four bearers available, use the fore-and-aft carry (see page 238). You must not lift someone whom you suspect has a spinal injury (see box, below).

BLANKET LIFT

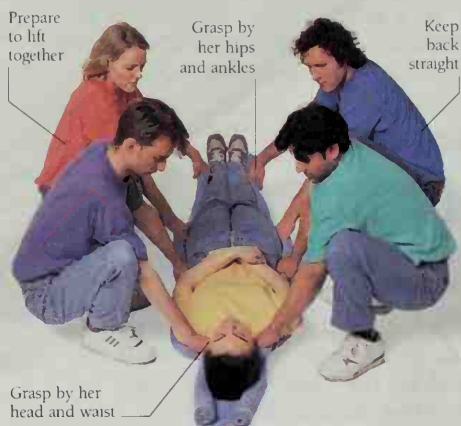
DO NOT lift someone whom you suspect has a fractured spine. If an immediate risk to life outweighs the danger of movement, use the "log-roll" technique (see page 145).



1 Roll a blanket lengthwise to half its width, and place it alongside the injured person. Turn her onto her side and place the roll against her back.



2 Turn her back over the blanket roll and onto her other side. Unroll enough of the blanket to lay the injured person down flat on it.



3 Tightly roll the open blanket on both sides to meet her body; the rolls act as handles for the bearers.

4 Two bearers squat on either side, one at her trunk and the other at her legs, and grasp the rolls firmly.

5 On command, all four bearers lift the injured person by leaning back and straightening their knees.

Hold her weight close to your body

Ensure that your knees are straight



CARRYING A STRETCHER

On the rare occasions when it is necessary to transport someone any distance on a stretcher, follow the technique described below. The most experienced First Aider should assume leadership and coordinate the actions of the other bearers, giving commands for each movement.

As a general rule, always carry a stretcher with the feet first, except in the following circumstances:

- ◆ when carrying someone with serious limb injuries, or someone with hypothermia, *down* stairs or down an incline, such as a hillside.
 - ◆ when carrying someone with a stroke (see page 119) or cerebral hemorrhage (see page 115), he or she should not be carried with the head lower than the feet.
- More advanced techniques for carrying can be found in standard manuals on EMS training.

METHOD

1 One bearer stands at each of the four handles.

IF there are only three bearers, two stand at the head and one at the feet.

2 Each bearer squats and grasps a handle firmly. On command, all bearers rise together and stand holding the stretcher level.

3 On a further command, the bearers move off, each on the foot next to the stretcher. They take short steps, keeping the stretcher close to their bodies.

4 To lower the person, the bearers stop on command. On a further command, they squat, and lower the stretcher until it rests gently on the ground.



LOADING AMBULANCES

This is carried out by a trained ambulance crew. Only assist if you are asked to do so. If you are asked, you will be given specific instructions.

RESCUE BY HELICOPTER

Rescue helicopters are used for sea and mountain evacuation; smaller helicopter ambulances are used in less remote locations. When a helicopter is landing, ground activities are usually coordinated by a member of the emergency services. Your main aims as a First Aider are to care for the injured

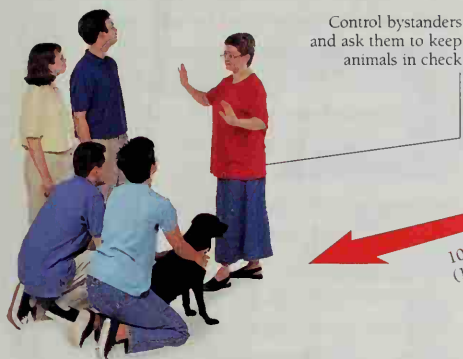
and control bystanders. However, you should be aware of the standard ground-safety precautions while the helicopter is landing, and the guidelines that you should follow to ensure your own safety once it is on the ground. The complete procedure is detailed below.

SAFETY PROCEDURES

1 Limit crowd access to a circle of 100 yards (100 meters) diameter, and keep any animals under control.

2 Extinguish any cigarettes within 100 yards (100 meters) of the landing area. Remove loose articles, such as broken branches.

IF possible, ask someone to hold up a piece of light material as a windsock for the crew.



Control bystanders and ask them to keep animals in check

Pilot chooses landing point

100 yards
(100) meters

100 yards
(100) meters

3 As the helicopter is landing, kneel at the ten o'clock position to its nose, well clear of the rotor blade.

DO NOT move as the helicopter lands.

DO NOT approach the helicopter. Wait until escorted by a flight crew member.

DO NOT touch winch lines until they reach the ground; they carry a static electrical charge until earthed.

4 Once the helicopter has landed, wait for instructions from the flight crew.

IF asked to approach, lower your head and walk to the door indicated.

REGULATIONS AND LEGISLATION

First aid may be practiced in any situation where accidents or illnesses have occurred. In many instances, the first person on the scene is an ordinary citizen who wants to help, rather than someone who is medically trained.

There are no laws in the United States that govern the administration of first aid in such cases, although it is important to be aware that giving first aid to others involves certain ethical and legal considerations.

GOOD SAMARITAN PRINCIPLES

People are encouraged to help those in distress by an acceptance in all 50 states of Good Samaritan principles. If you assist someone during an emergency, acting in good faith with neither compensation nor gross negligence, the law will generally grant you immunity.

In any circumstances where help may be needed, you must identify yourself and get permission from the victim to provide assistance. An individual has the right to refuse your offer of help and this must be respected.

In some circumstances, obtaining consent from the afflicted individual is not possible. In the case of a young child, consent should be obtained from the immediate family or parent, if they are present. Consent is implied with an unconscious person in a life-threatening condition, because it is assumed that an unresponsive victim would consent to lifesaving interventions. Consent is also implied when the first-aider begins care and the victim does not resist. However, some people do not wish to be resuscitated. Such information may be visible on a Medic Alert bracelet or on a card in the victim's wallet. This request must always be honored.

Provide any first-aid assistance to the best of your abilities. Having once accepted the responsibility of assisting someone in need, do not abandon that person until other appropriate help has arrived, you are too exhausted to continue, or your own life is in danger. If you are unsure of yourself, call for

help or do what you know, while waiting for someone more experienced to take over.

Providing first-aid assistance to someone in need is a humanitarian act supported by society. As long as you respect the wishes of the individual and provide care to the very best of your ability, your first-aid skills will be appreciated by those you assist, and valued by your community.

TAKING FIRST-AID COURSES

In reading this Manual you have taken an important first step in familiarizing yourself with first-aid principles and practices. By learning the content of this book you will be well-equipped to have the confidence and knowledge needed to administer first aid to acutely ill and injured people.

However, it is very important to combine this knowledge of first aid with the practical skills necessary to provide physical care and assistance to those in need. The best method of attaining these skills is to take a first-aid course from a qualified first-aid instructor.

First-aid courses are provided by the American Red Cross, National Safety Council, and various other organizations. Ask friends who have trained in first aid to recommend a course suitable to your needs, or call providers listed in your telephone directory listed under "First-Aid Services."

With the information and skills you acquire, you should be comfortable providing first aid and confident in your ability to assist someone in need.

EMERGENCY FIRST AID

19

This section has been designed to help you administer effective first aid instantaneously for conditions that are life-threatening or very serious. It is positioned at the back of the *Manual* for quick access in an emergency.

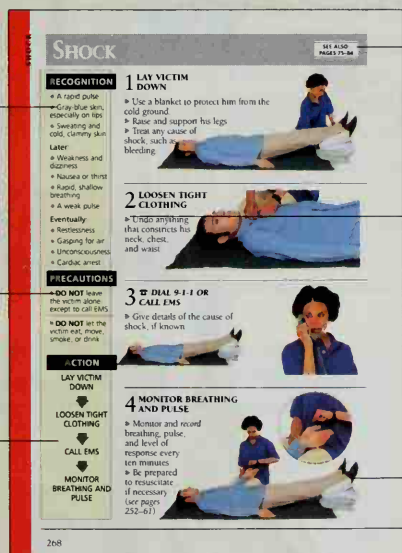
Read the quick-reference action plan on pages 252–53, which will help you establish your priorities and guide you through the correct course of action for dealing with a conscious or an unconscious victim.

HOW TO USE THIS SECTION

Recognition lists help you to make quick diagnosis

Precaution boxes help you to decide on best course of action

Action summaries enable you to give quick and effective treatment



Cross references refer you to relevant chapters in book

Bullet points allow you to access information quickly

Photographs show you how to treat the injured step-by-step

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ACTION IN AN EMERGENCY

1 ASSESS THE SITUATION

Are there any risks to you or the injured?

YES

- ◆ Put your safety first.
- ◆ If possible, remove the danger from the victim.
- ◆ If not possible, remove the victim from danger.
- ◆ When it is safe:

◆ Move on to **step 4** and carry out the resuscitation sequence for **one minute** before calling EMS.

NO

2 ASSESS THE INJURED

Is the victim visibly conscious?
If he has collapsed, does he respond to tapping of the shoulders?



YES

- ◆ Treat the victim and call EMS if necessary

NO

3 ASSESS THE CONDITION

Is the condition due to **injury** or **drowning**, or is the victim a **child**?

NO

ARE YOU ALONE?

NO

- ◆ Move on to **step 4**. Carry out resuscitation sequence. If **breathing is absent**, call EMS immediately.

YES

ARE YOU ALONE?

NO

- ◆ Ask a helper to call EMS, and to pass on details of the victim's condition.
- ◆ Move on to **step 4** and carry out the resuscitation sequence.

YES

TREATMENTS FOR OTHER CONDITIONS

See the following pages for step-by-step treatments:

262 Asthma Attack
263 Choking: Adult
264 Choking: Child
265 Choking: Baby

266 Heart Attack
267 Severe Bleeding
268 Shock
269 Eye Injury
270 Unconsciousness
271 Head Injury

272 Convulsions
274 Broken Bones
275 Neck or Back Injuries
276 Burns
278 Swallowed Poisons
279 Allergic Reactions

4 OPEN THE AIRWAY; CHECK BREATHING

Gently tilt the head back and check for breathing (see page 254).



Is the victim breathing?

NO

YES

◆ Place the victim in the recovery position (see page 256).



5 RESCUE BREATHING

ADULT: Give two breaths of mouth-to-mouth breathing (see page 258).

CHILD/BABY: Give five breaths (see page 259).

Has breathing returned?

NO

YES



6 ASSESS FOR CIRCULATION

Check for signs of circulation (normal breathing, coughing, or movement) (see page 260).

Are there any signs of circulation?

NO

YES

◆ Continue rescue breathing (see step 5).

◆ Check the pulse and look for signs of recovery after every minute.



7 BEGIN CPR

ADULT: Alternate 15 chest compressions with two breaths of rescue breathing (see page 260); repeat as needed.

CHILD/BABY: Give five compressions to one breath (see page 261).

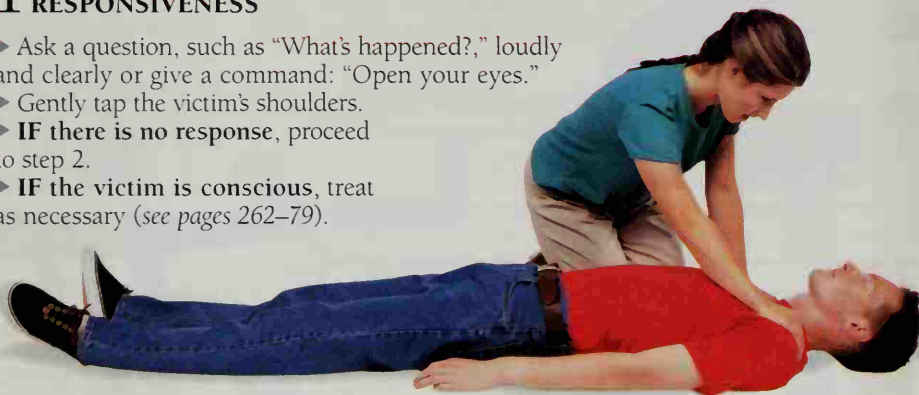


ASSESS THE INJURED

ADULT

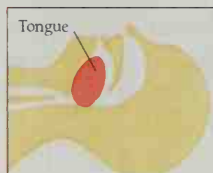
1 CHECK RESPONSIVENESS

- ▶ Ask a question, such as "What's happened?," loudly and clearly or give a command: "Open your eyes."
- ▶ Gently tap the victim's shoulders.
- ▶ **IF there is no response**, proceed to step 2.
- ▶ **IF the victim is conscious**, treat as necessary (see pages 262–79).

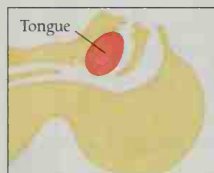


2 OPEN AIRWAY

- ▶ Place two fingers under the victim's chin and your other hand on the forehead, and tilt the head back.



Closed airway

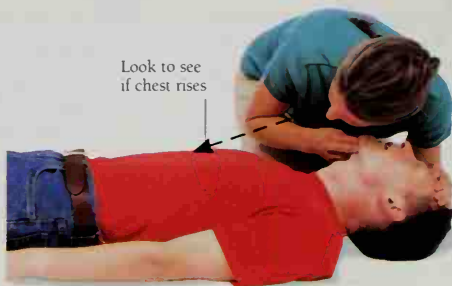


Open airway



3 CHECK BREATHING

- ▶ Check breathing for up to ten seconds, by looking for chest movement, listening for sounds of breathing, and feeling for breath on your cheek.
- IF breathing is absent**, administer rescue breathing (see page 258).
- IF breathing is present**, place the victim in the recovery position (see page 256).



BABY OR CHILD (AGED 0-7)

1 CHECK RESPONSE

- Try to stimulate the baby or child by talking to her or tapping her shoulders.

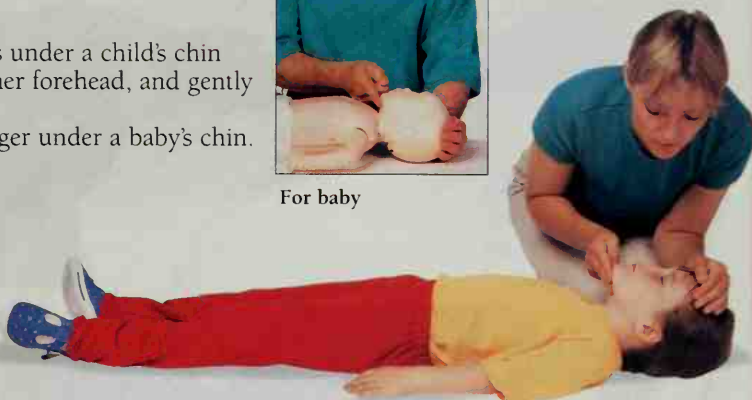


2 OPEN AIRWAY

- Place two fingers under a child's chin and one hand on her forehead, and gently tilt the head back.
- Use only one finger under a baby's chin.



For baby



3 CHECK BREATHING

- Check breathing for up to ten seconds by looking for chest movement, listening for breathing sounds, and feeling for breath on your cheek.

IF breathing is absent, administer rescue breathing (see page 259).

IF breathing is present, place the child in the recovery position (see page 257).



For baby

Look to see
if chest rises



THE RECOVERY POSITION

1 OPEN AIRWAY AND STRAIGHTEN LIMBS

- Place two fingers under the victim's chin and one hand on his forehead, and gently tilt his head back.
- Straighten his limbs.
- Place the nearest arm at right angles to the body.



Tilt head to open airway

2 POSITION FAR ARM, HAND, AND KNEE

- Bring the furthest arm from you across the victim's chest.
- Hold the back of his hand against his cheek.
- Using your other hand, pull up the victim's far leg, just above the knee.



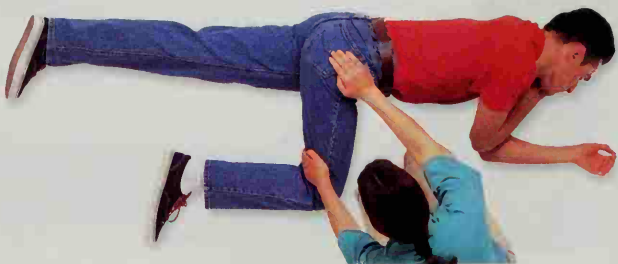
3 ROLL VICTIM TOWARD YOU

- Keeping the victim's hand pressed against his cheek, pull on the far leg and roll him toward you, until he is lying on his side.
- Ensure that the airway is open.



4 BEND VICTIM'S KNEE

- Bend the victim's upper leg at the knee so that it is at a right angle to his body.



SEE ALSO:
PAGES 41-58 and 146

5 DIAL 9-1-1 OR CALL EMS

► Monitor and record breathing and pulse every 10 minutes until help arrives.



Keep head tilted so that airway remains open



BABY (UNDER ONE)

► Cradle the baby in your arms with his head tilted downwards to prevent him from choking on his tongue or inhaling vomit.



CHILD (AGED 1-7)

► Place the child in the recovery position to prevent him from choking on his tongue or inhaling vomit. The procedure for placing him in this position is the same as for an adult (*see opposite*).



Tilt head to open airway



WHEN IN DOUBT, WAIT FOR HELP

IF you suspect back or neck injuries, do not move the victim unless he is in danger or the airway is obstructed. Whenever possible, wait until EMS arrives with specialized equipment and medical expertise. EMS personnel are professionally trained and well equipped to manage spinal injuries. They will use

specialty designed collars, spine immobilizers, back boards, and stretchers, supplemented with rolls, tape and restraining straps to immobilize and allow safe transport of the victim. If you must move a victim, keep his head, neck, trunk, and toes, in a straight line at all times during the maneuver (*see page 145*).

RESCUE BREATHING

1 OPEN AIRWAY

- ▶ Place two fingers under the chin and one hand on the forehead, and gently tilt the head back.



2 REMOVE ANY OBVIOUS OBSTRUCTION

- ▶ Hold the victim's chin with your fingers and place your thumb inside his mouth to hold his tongue.
- ▶ Holding the tongue and jaw firm, lift the jaw with your other hand. Use your index finger to remove any foreign body you can see from the mouth.

Sweep finger around mouth to hook out obstruction



3 PINCH VICTIM'S NOSE

- ▶ Use your thumb and index finger to pinch the victim's nose firmly.
- ▶ Make sure that the nostrils are tightly closed to prevent air from escaping.



4 GIVE MOUTH-TO-MOUTH RESPIRATION

- ▶ Take a full breath. Place your lips around the victim's lips and make a good seal.
- ▶ Blow into the mouth until the chest rises. Take about two seconds for full inflation.



Note: Use a face mask or shield barrier if you have one.

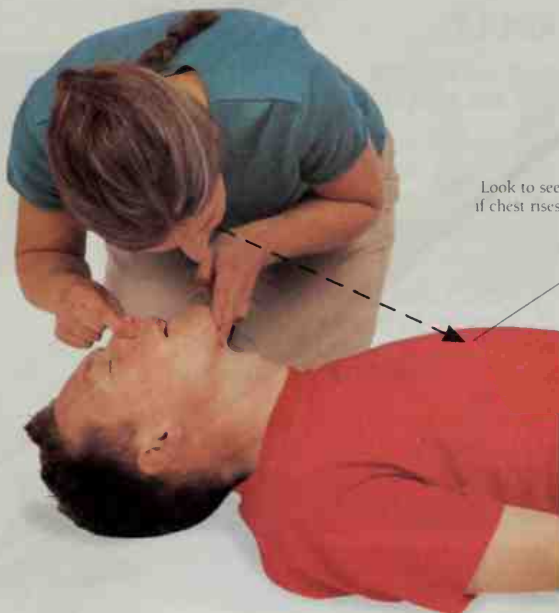
5 REPEAT BREATH AND REASSESS INJURED

- Keeping your hands in the same position, remove your lips and allow the chest to fall fully.
- Repeat mouth-to-mouth respiration once more.
- Check for signs of circulation (normal breathing, coughing, or movement).

IF signs of circulation are absent, begin Cardiopulmonary Resuscitation (CPR, *see page 260*).

IF the pulse is present, continue with rescue breathing every five seconds. Recheck for signs of recovery after every ten breaths.

IF breathing returns, place the victim in the recovery position (*see page 256*).



FOR A BABY (UNDER ONE) OR A CHILD (AGED 1-7)

GIVE MOUTH-TO-MOUTH RESPIRATION FOR ONE MINUTE

- Carefully remove any *obvious* obstruction from the mouth.
- Seal your lips tightly around the mouth and nose for a baby, or just the mouth for a child.
- Breathe into the lungs until the chest rises.
- Give five breaths.

► Check for signs of circulation (normal breathing, coughing, or movement) (*see page 261*) and look for other signs of recovery.

IF signs of circulation are absent, begin (CPR, *see page 261*).

IF signs of circulation are present, continue artificial respiration for one minute, then call EMS.



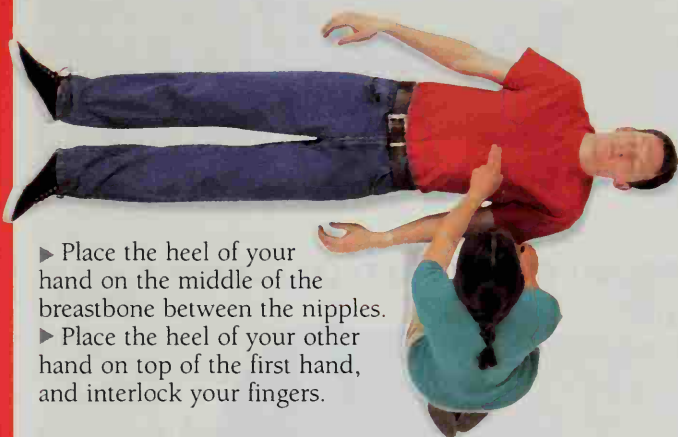
BEGIN CPR

ADULT

1 ASSESS FOR CIRCULATION

► Check for signs of circulation (normal breathing, coughing, or movement). If any is present, continue to support breathing. If all are absent, begin CPR.

2 POSITION HANDS FOR CHEST COMPRESSIONS



- Place the heel of your hand on the middle of the breastbone between the nipples.
- Place the heel of your other hand on top of the first hand, and interlock your fingers.



Interlock fingers

3 GIVE CHEST COMPRESSIONS AND MOUTH-TO-MOUTH

- Lean over the victim with your arms straight.
- Press down vertically on the breastbone and depress it by approximately $1\frac{1}{2}$ –2 in (4–5 cm).
- Complete 15 chest compressions, at a rate of 80–100 per minute.
- Give two breaths of mouth-to-mouth respiration (see page 258).
- Continue alternating 15 chest compressions with two breaths of mouth-to-mouth respiration.

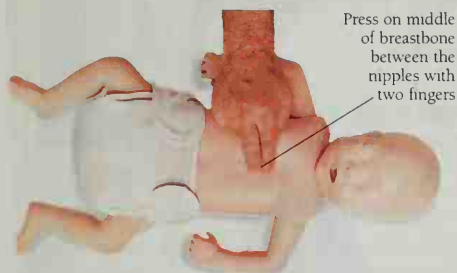


BABY (UNDER ONE)



1 ASSESS BABY FOR CIRCULATION

► Check for signs of circulation (normal breathing, coughing, or movement). If any is present, continue to support breathing. **IF are absent, begin CPR.**



2 GIVE CHEST COMPRESSIONS AND MOUTH-TO-MOUTH

► Place the tips of two fingers in middle of the breastbone between the nipples.
► Press down firmly at this point, $\frac{1}{2}$ –1 in (1–3 cm). Do this five times at a rate of about 100 compressions per minute.

Give one breath of mouth-to-mouth respiration (see page 259). Alternate five chest compressions with one breath for one minute before calling EMS, and while waiting for help.

CHILD (AGED 1–7)

► **IF the child is eight years or over, treat as for an adult (see opposite).**



1 ASSESS CHILD FOR CIRCULATION

► Check for signs of circulation (normal breathing, coughing, or movement). If any is present, continue to support breathing. **IF are absent, begin CPR.**



2 GIVE CHEST COMPRESSIONS AND MOUTH-TO-MOUTH

► Position your hand as you would for an adult (see opposite), but use the heel of one hand only.

► Press down firmly 1–1½ in (3–4 cm). Do this five times at a rate of about 100 per minute.

► Give one breath of mouth-to-mouth respiration (see page 259). Alternate five chest compressions with one breath for one minute before calling EMS, and while waiting for help.

ASTHMA ATTACK

SEE ALSO:
PAGES 59-74

RECOGNITION

- ◆ Difficulty breathing

There may be:

- ◆ Wheezing
- ◆ Difficulty speaking
- ◆ Gray-blue skin
- ◆ Dry, tickly cough

PRECAUTIONS

- **DO NOT** lay the person down.

- **DO NOT** use a preventer inhaler.

- **IF** the person falls unconscious, be prepared to resuscitate if necessary (see pages 252-61).

- **IF** the inhaler has no effect after 5-10 minutes,
☎ **DIAL 9-1-1 OR CALL EMS.**

ACTION

MAKE PERSON
COMFORTABLE



ENCOURAGE
INHALER USE



COMFORT AND
REASSURE

1 MAKE PERSON COMFORTABLE

- ▶ Keep calm and help reassure the person.
- ▶ Help her into a position that she finds most comfortable; sitting slightly forward is usually best.



2 ENCOURAGE PERSON TO USE INHALER

- ▶ Help the person find her *reliever* inhaler (it is usually a blue color).
- ▶ Allow her to use the inhaler; it should take effect within minutes.
- ▶ Ask her to use her inhaler every 5-10 minutes. Monitor and *record* breathing and pulse every ten minutes.



3 COMFORT AND REASSURE

- ▶ If the attack eases within 5-10 minutes, encourage the person to take another dose from her *reliever* inhaler.
- ▶ Do your best to try and reassure her.
- ▶ If the attack is severe or unrelieved, take or send her to the hospital, or ☎ **DIAL 9-1-1 OR CALL EMS.**



CHOKING: ADULT

SEE ALSO:
PAGES 59-74

RECOGNITION

- ◆ Difficulty speaking and breathing

There may be:

- ◆ Congested face and neck initially
- ◆ Distress

Later:

- ◆ Gray-blue skin

PRECAUTIONS

- IF the victim becomes unconscious, lay person down and perform CPR (see page 65).

ACTION

DETERMINE IF
PERSON IS
CHOKING



HOLD PERSON
FROM BEHIND



GIVE
ABDOMINAL
THRUSTS



CONTINUE
ABDOMINAL
THRUSTS IF
NECESSARY

1 DETERMINE WHETHER THE PERSON IS CHOKING

- ▶ Ask the person "Are you choking?"
- ▶ If the person can speak or cough, do not interfere.
- ▶ If the person cannot speak or cough, proceed to Step 2.



2 HOLD PERSON FROM BEHIND

- ▶ Stand behind the person.
- ▶ Put your arms around her. Put one fist below her ribcage; thumb-side of fist against abdomen.



3 GIVE ABDOMINAL THRUSTS

- ▶ Link your hands and pull sharply inward and upward.
- ▶ Continue abdominal thrusts until the blockage clears or the person becomes unconscious.



Thumb side of
fist against
abdomen

4 CONTINUE ABDOMINAL THRUSTS

- ▶ If unconscious, lay her down and perform CPR until the blockage clears (see page 65).

CHOKING: CHILD

SEE ALSO:
PAGES 59-74

RECOGNITION

- ◆ Difficulty speaking and breathing
- ◆ Flushed face and neck
- ◆ Distress

Later:

- ◆ Gray-blue skin

PRECAUTIONS

- **DO NOT** feel blindly down the throat.
- **IF** the child becomes unconscious, lay her down and begin CPR (see page 67).

ACTION

DETERMINE
WHETHER THE
CHILD IS CHOKING



PREPARE TO GIVE
ABDOMINAL
THRUSTS



GIVE
ABDOMINAL
THRUSTS



CONTINUE
ABDOMINAL
THRUSTS



CALL EMS

1 DETERMINE WHETHER THE CHILD IS CHOKING

- ▶ Ask the child "Are you choking?"
- ▶ If the child can speak or cough, do not interfere.
- ▶ If the child cannot speak or cough, proceed to Step 2.



2 PREPARE TO GIVE ABDOMINAL THRUSTS

- ▶ Stand or kneel behind the child. Wrap your arms around her abdomen just above the line of the hips. Make a fist with one hand and place the thumb side of your fist against the middle of her abdomen, just above her navel.



3 GIVE ABDOMINAL THRUSTS

- ▶ Grasp your fist with your other hand and press into her abdomen with a quick upward thrust.



4 CONTINUE ABDOMINAL THRUSTS

- ▶ Repeat steps 2 and 3 as necessary. If the child becomes unconscious, lay her down, and perform CPR.

☎ **DIAL 9-1-1 OR CALL EMS.**



RECOGNITION

- ◆ Difficulty breathing
- ◆ Flushed face and neck
- ◆ Strange noises or no sound

Later:

- ◆ Gray-blue skin

PRECAUTIONS

- **DO NOT** feel blindly down the throat.
- **DO NOT** use abdominal thrusts on a baby.
- **IF** at any stage the obstruction clears, or the baby becomes unconscious, begin resuscitation (see pages 252–61).

ACTION

GIVE UP TO FIVE
BACK BLOWS



CHECK BABY'S
MOUTH



GIVE UP TO FIVE
CHEST THRUSTS



REPEAT SEQUENCE
AND CALL EMS

1 GIVE UP TO FIVE BACK BLOWS

- ▶ Lay the baby face down along your forearm.
- ▶ Give up to five sharp blows on his mid-upper back.



2 CHECK BABY'S MOUTH

- ▶ Turn your baby face up on your arm or lap.
- ▶ Use one finger to remove any *obvious* obstruction, without touching the baby's throat.
- ▶ If back blows have failed, proceed to next step.



3 GIVE UP TO FIVE CHEST THRUSTS

- ▶ Place two fingertips on the baby's breastbone, between the nipples.
- ▶ Give up to five chest thrusts.
- ▶ Check his mouth again.



4 REPEAT ENTIRE SEQUENCE

- ▶ Repeat steps 1–3 three times.
 - ▶ If the obstruction has not cleared,
- ☎ DIAL 9-1-1 OR CALL EMS.**
- ▶ Repeat steps 1–3 until help arrives.

HEART ATTACK

SEE ALSO:
PAGES 75-84

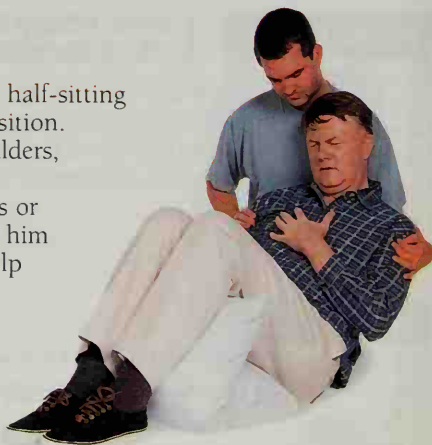
RECOGNITION

There may be:

- ◆ Vicelike chest pain, spreading to left arm
- ◆ Breathlessness
- ◆ Discomfort, like indigestion
- ◆ Sudden faintness
- ◆ A sense of impending doom
- ◆ Ashen skin
- ◆ Blueness at lips
- ◆ A rapid, then weakening, pulse
- ◆ Sudden collapse

1 MAKE VICTIM COMFORTABLE

- ▶ Help the victim into a half-sitting or other comfortable position.
- ▶ Support his head, shoulders, and knees.
- ▶ If the victim has tablets or an inhaler for angina, let him administer it himself. Help him if necessary.
- ▶ Reassure victim.



PRECAUTIONS

■ IF the victim becomes unconscious, be prepared to resuscitate if necessary (see pages 252-60).

2 DIAL 9-1-1 OR CALL EMS

- ▶ Tell the dispatcher that you suspect a heart attack.
- ▶ Call the victim's doctor also, if he asks you to do so (after calling 9-1-1).



ACTION

MAKE VICTIM COMFORTABLE



CALL EMS



MONITOR BREATHING AND PULSE

3 MONITOR BREATHING AND PULSE

- ▶ Encourage the victim to rest and keep any bystanders at a distance.
- ▶ Monitor and *record* the victim's breathing and pulse frequently.
- ▶ Reassure the person until EMS arrives.



SEVERE BLEEDING

SEE ALSO:
PAGES 85-106

PRECAUTIONS

■ **DO NOT** apply a tourniquet.

■ **IF** there is an embedded object in the wound, apply pressure on either side of the wound, and pad around it before bandaging.

■ **IF** possible, wear gloves to protect against infection.

■ **IF** the victim becomes unconscious, place her in the recovery position, and be ready to resuscitate if needed (see pages 252-61).

ACTION

APPLY PRESSURE
TO WOUND



RAISE AND
SUPPORT
INJURED PART



BANDAGE
WOUND



CALL
EMS



TREAT FOR
SHOCK AND
MONITOR VICTIM

1 APPLY PRESSURE TO WOUND

- ▶ Remove or cut the victim's clothing to expose wound.
- ▶ If a sterile dressing or pad is *immediately* available, cover the wound.
- ▶ Apply direct pressure over the wound with your fingers or palm of your hand.



2 RAISE AND SUPPORT INJURED PART

- ▶ Make sure the injured part is raised above the level of the victim's heart.
- ▶ Lay the victim down.
- ▶ Handle the injured part gently if you suspect the injury involves a fracture.



3 BANDAGE WOUND

- ▶ Apply a sterile dressing over any original pad, and bandage firmly in place.
- ▶ Bandage another pad on top if blood seeps through.
- ▶ Check the circulation beyond the bandage at intervals; loosen it if needed.



4 DIAL 9-1-1 OR CALL EMS

- ▶ Give details of the site of the injury and the extent of the bleeding when you telephone.

5 TREAT FOR SHOCK AND MONITOR VICTIM

- ▶ Treat for shock (see page 268).
- ▶ Monitor and *record* breathing, pulse, and level of response.

SHOCK

SEE ALSO:
PAGES 75-84

RECOGNITION

- ◆ A rapid pulse
- ◆ Gray-blue skin, especially on lips
- ◆ Sweating and cold, clammy skin

Later:

- ◆ Weakness and dizziness
- ◆ Nausea or thirst
- ◆ Rapid, shallow breathing
- ◆ A weak pulse

Eventually:

- ◆ Restlessness
- ◆ Gasping for air
- ◆ Unconsciousness
- ◆ Cardiac arrest

PRECAUTIONS

- **DO NOT** leave the victim alone, except to call EMS.
- **DO NOT** let the victim eat, move, smoke, or drink.

ACTION

LAY VICTIM
DOWNLOOSEN TIGHT
CLOTHING

CALL EMS

MONITOR
BREATHING AND
PULSE1 LAY VICTIM
DOWN

- Use a blanket to protect him from the cold ground.
- Raise and support his legs.
- Treat any cause of shock, such as bleeding.

2 LOOSEN TIGHT
CLOTHING

- Undo anything that constricts his neck, chest, and waist.

3 ☎ DIAL 9-1-1 OR
CALL EMS

- Give details of the cause of shock, if known.

4 MONITOR BREATHING
AND PULSE

- Monitor and *record* breathing, pulse, and level of response every ten minutes.
- Be prepared to resuscitate if necessary (see pages 252-61).



EYE INJURY

SEE ALSO:
PAGES 98 and 165-6

RECOGNITION

- ◆ Intense pain in the affected eye

There may also be:

- ◆ A visible wound
- ◆ A bloodshot eye if wound is not visible
- ◆ Partial or total loss of vision
- ◆ Leakage of blood or clear fluid from the injured eye

PRECAUTIONS

- **DO NOT** touch the eye or any contact lens, or allow the victim to rub the eye.
- **IF** it will take some time to obtain medical aid, bandage an eye pad in place over the injured eye.

ACTION

SUPPORT THE
VICTIM'S HEAD



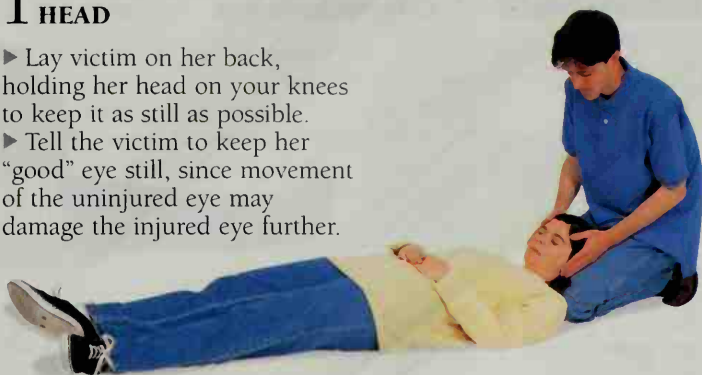
USE AN
EYE DRESSING



SEND
VICTIM TO THE
HOSPITAL
OR CALL EMS

1 SUPPORT THE VICTIM'S HEAD

- Lay victim on her back, holding her head on your knees to keep it as still as possible.
- Tell the victim to keep her "good" eye still, since movement of the uninjured eye may damage the injured eye further.



2 USE AN EYE DRESSING

- Give the victim a sterile dressing or clean pad, and ask her to hold it over the injured eye and to keep her uninjured eye closed.



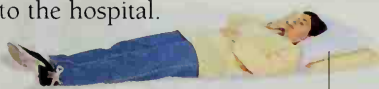
Victim holds eye pad while you steady head



DO NOT use an eye dressing if there is a foreign body or laceration to the eye.

3 SEND VICTIM TO THE HOSPITAL

- Call EMS if you cannot take the victim to the hospital.



Provide support for victim's head



UNCONSCIOUSNESS

SEE ALSO:
PAGES 107–22

PRECAUTIONS

- **DO NOT** leave the victim alone, except to call EMS.
- **DO NOT** give anything by mouth.
- **IF** the victim does not regain full consciousness, ☎ DIAL 9-1-1 OR CALL EMS. Monitor and record breathing, pulse, and response every ten minutes.
- **IF** necessary, be prepared to resuscitate (see pages 252–61).

ACTION

ASSESS
RESPONSIVENESS



OPEN AIRWAY;
CHECK
BREATHING
AND PULSE



EXAMINE AND
TREAT VICTIM



PLACE IN
RECOVERY
POSITION



CALL
EMS

1 ASSESS RESPONSIVENESS

- ▶ Gently tap the victim's shoulders.
- ▶ Question the victim, speaking loudly and clearly.
- ▶ Record her level of response.



2 OPEN AIRWAY; CHECK BREATHING AND PULSE

- ▶ Place two fingers under the victim's chin and one hand on her forehead: tilt her head back. (if no concern for neck or spine injury).
- ▶ Check breathing and pulse (see page 254).



3 EXAMINE AND TREAT VICTIM

- ▶ Examine the victim.
- ▶ Control bleeding (see page 267).
- ▶ Support suspected fractures (see page 274).
- ▶ Treat any other life-threatening conditions.



4 PLACE VICTIM IN RECOVERY POSITION

- ▶ If you suspect spinal injury, do not move the victim (see page 257).



5 ☎ DIAL 9-1-1 OR CALL EMS



PRECAUTIONS

- **IF** possible, wear gloves to protect against infection.
- **IF** the injured becomes unconscious, place her in the recovery position (see page 256), and be ready to resuscitate if necessary (see pages 252-61).
- **IF** the injured is unconscious,
☎ **DIAL 9-1-1 OR CALL EMS.**
- **IF** bleeding does not stop, reapply pressure on the wound, and add a second pad.

ACTION

CONTROL BLEEDING



SECURE DRESSING WITH BANDAGE



LAY THE INJURED DOWN



TAKE OR SEND TO THE HOSPITAL OR CALL EMS

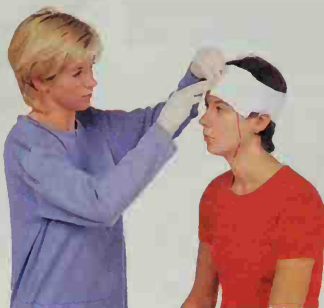
1 CONTROL BLEEDING

- ▶ Replace any displaced skin flaps.
- ▶ Place a sterile dressing or clean pad over the wound and apply firm, direct pressure.



2 SECURE DRESSING WITH BANDAGE

- ▶ Secure the dressing over the wound with a roller bandage.



3 LAY THE INJURED DOWN

- ▶ Ensure her head and shoulders are slightly raised.
- ▶ Make sure that she is comfortable.



4 TAKE OR SEND THE PERSON TO THE HOSPITAL

- ▶ Call EMS or take the injured to the hospital.



CONVULSIONS: ADULT

SEE ALSO:
PAGES 107-22

RECOGNITION

- ◆ Unconsciousness
- ◆ Rigidity
- ◆ Breathing may cease
- ◆ Convulsive movements
- ◆ Muscles relax
- ◆ Victim regains consciousness

PRECAUTIONS

■ **DO NOT** use force to restrain the victim.

■ **IF** the victim is unconscious for more than ten minutes, is having repeated fits, or it is her first fit, ☎ DIAL 9-1-1 OR CALL EMS. Note the time and duration of the fit.

ACTION

SUPPORT
VICTIM



PROTECT
VICTIM



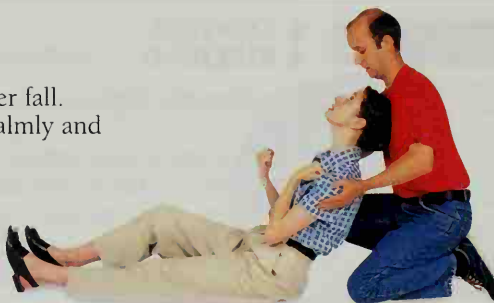
PROTECT THE
HEAD AND
LOOSEN TIGHT
CLOTHING



PLACE VICTIM
IN RECOVERY
POSITION

1 SUPPORT VICTIM

- ▶ Try to ease her fall.
- ▶ Talk to her calmly and reassuringly.



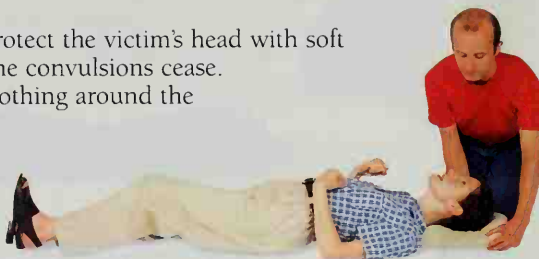
2 PROTECT VICTIM

- ▶ Clear away any surrounding objects to prevent injury to the victim.
- ▶ Ask bystanders to keep clear.



3 PROTECT VICTIM'S HEAD

- ▶ If possible, protect the victim's head with soft material until the convulsions cease.
- ▶ Undo tight clothing around the victim's neck.



4 PLACE VICTIM IN RECOVERY POSITION

- ▶ Place the victim in the recovery position (see page 256).
- ▶ Stay until the victim is fully recovered.



CONVULSIONS: CHILD

SEE ALSO:
PAGES 107-22

CONVULSIONS: CHILD

RECOGNITION

- ◆ Fever
- ◆ Violent muscle twitching

There may be:

- ◆ Twitching of the face
- ◆ Breath-holding
- ◆ Drooling at the mouth
- ◆ Loss of, or impaired, consciousness

ACTION

COOL CHILD



PROTECT CHILD
FROM INJURY



SPONGE WITH
TEPID WATER



PUT CHILD IN
RECOVERY
POSITION



CALL
EMS

1 COOL CHILD

- ▶ Remove his clothing.
- ▶ Ensure a good supply of cool air.



2 PROTECT CHILD FROM INJURY

- ▶ Clear away any nearby objects.
- ▶ Surround the child with soft padding.



3 SPONGE WITH TEPID WATER

- ▶ Start at his head and work down.



4 PUT CHILD IN RECOVERY POSITION

- ▶ Once the convulsions have ceased, put the child in the recovery position (see page 257).
- ▶ Keep his head tilted well back.



5 ☎ DIAL 9-1-1 OR CALL EMS



BROKEN BONES

SEE ALSO:
PAGES 123-54

PRECAUTIONS

- **DO NOT** attempt to bandage if medical assistance is on its way.
- **DO NOT** attempt to move the injured limb unnecessarily.
- **DO NOT** allow a victim with a suspected fracture to have anything to eat or drink.

ACTION

STEADY AND
SUPPORT
INJURED PART



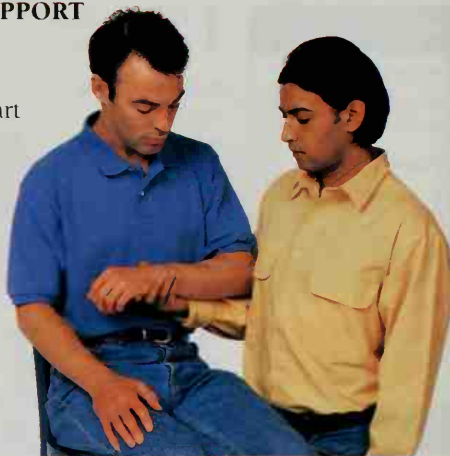
PROTECT INJURY
WITH PADDING



TAKE OR SEND
VICTIM TO THE
HOSPITAL,
DIAL 9-1-1 OR
CALL EMS

1 STEADY AND SUPPORT INJURED PART

- Help the victim to support the affected part above and below the injury in the most comfortable position.



2 PROTECT INJURY WITH PADDING

- Place padding, such as towels or cushions, around the affected part, and support it in position with a firm support (e.g. board) if available.



3 TAKE OR SEND VICTIM TO THE HOSPITAL

- Dial 9-1-1 or call EMS if you are unable to transport the victim to the hospital.



BACK INJURY

SEE ALSO:
PAGES 142-48

RECOGNITION

- ◆ Pain in neck or back
- ◆ A step or twist in curve of spine
- ◆ Tenderness to touch on spine

There may be:

- ◆ Loss of control over movement of limbs
- ◆ Loss of, or abnormal, sensation
- ◆ Difficulty in breathing

PRECAUTIONS

■ **DO NOT** move the victim unless she is in danger or she becomes unconscious.

■ **IF** the victim becomes unconscious, put her into recovery position while keeping the head and neck aligned with the spine. Be ready to resuscitate if necessary (see pages 252-61).

ACTION

STEADY AND
SUPPORT HEAD



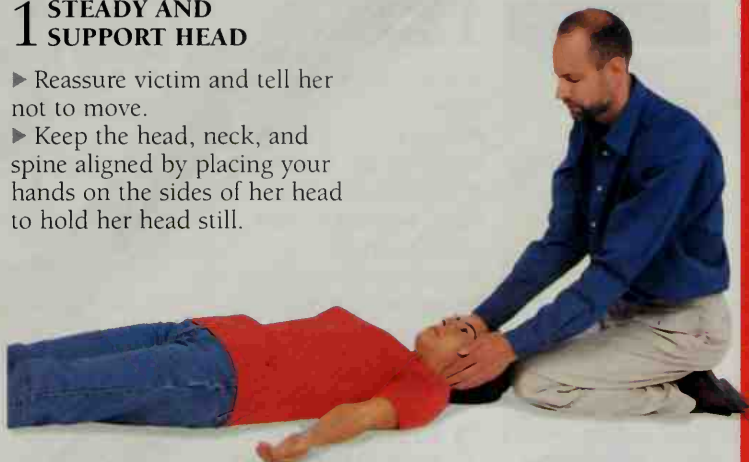
SUPPORT VICTIM'S
NECK



DIAL 9-1-1 OR
CALL EMS

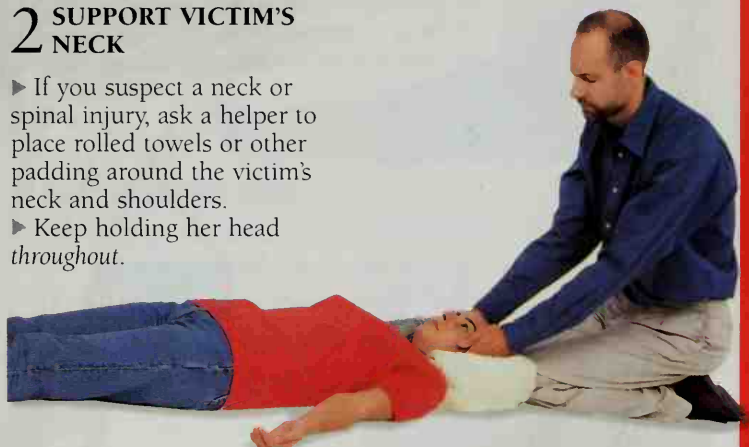
1 STEADY AND SUPPORT HEAD

- ▶ Reassure victim and tell her not to move.
- ▶ Keep the head, neck, and spine aligned by placing your hands on the sides of her head to hold her head still.



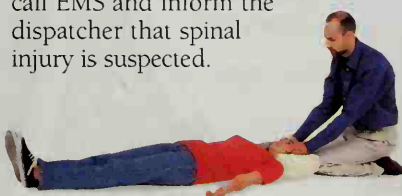
2 SUPPORT VICTIM'S NECK

- ▶ If you suspect a neck or spinal injury, ask a helper to place rolled towels or other padding around the victim's neck and shoulders.
- ▶ Keep holding her head throughout.



3 ☎ DIAL 9-1-1 OR CALL EMS

- ▶ If possible, ask a helper to call EMS and inform the dispatcher that spinal injury is suspected.



BURNS: TREATMENT

SEE ALSO:
PAGES 155-66

PRECAUTIONS

■ **DO NOT** apply lotions, ointment, or fat to a burn, or touch the injured area or burst any blisters.

■ **DO NOT** remove anything sticking to the burn.

■ **IF** the burn is to the face, do not cover it. Keep cooling with water until help arrives.

■ **IF** the burn is large or deep, treat the victim for shock (see page 268).

☎ **DIAL 9-1-1 OR CALL EMS.** Monitor and record breathing, pulse, and level of response every ten minutes.

■ **IF** the burn is chemical, rinse for at least 20 minutes.

ACTION

COOL BURN



REMOVE ANY
CONSTRICTIONS



COVER BURN



TAKE OR SEND
TO THE HOSPITAL
OR CALL EMS

1 COOL BURN

- ▶ Make the victim comfortable.
- ▶ Pour cool liquid on injury for ten minutes.
- ▶ While cooling the burn, watch for signs of difficulty in breathing. Be ready to resuscitate if needed (see pages 252-61).



2 REMOVE ANY CONSTRICTIONS

- ▶ Carefully remove any clothing or jewelry from the affected area before the injury starts to swell.



3 COVER BURN

- ▶ Cover the burn and surrounding area with a sterile dressing, or a clean piece of material.
- ▶ Reassure the victim.



4 TAKE OR SEND TO THE HOSPITAL

- ▶ Call EMS to take the victim to the hospital.
- ▶ Record details of the victim's injuries and any possible hazards.



PRECAUTIONS

Fires

- **DO NOT** attempt to fight a fire unless it is safe and you have called the emergency services.
- **DO NOT** enter a burning building.
- **DO NOT** enter a smoke- or fume-filled room.

PRECAUTIONS

Clothing on Fire

- **DO NOT** use flammable materials to try to smother flames.
- **DO NOT** let the victim run around or go outdoors.

PRECAUTIONS

Electrical Injuries

- **DO NOT** go within 20 yards (18 meters) of live high-voltage electrical sources.

PRECAUTIONS

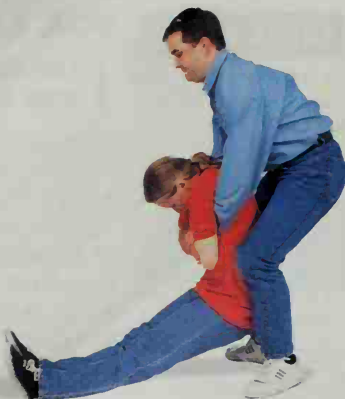
Chemical Spills

- **DO NOT** delay starting treatment by searching for antidote.
- **NEVER** attempt to neutralize acid or alkali burns.

FIRES

▶ **☎ DIAL 9-1-1 OR CALL EMS AND THE FIRE DEPARTMENT.**

▶ Remove the victim from danger, if it is safe to do so.



CLOTHING ON FIRE

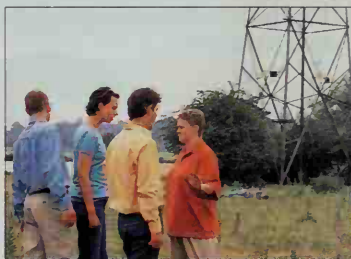
▶ Either:

- ◆ STOP, DROP, WRAP, and ROLL the victim on the ground; or
- ◆ lay the victim down, burning side upward, and douse him with water.



ELECTRICAL INJURIES

- ▶ Stay clear of the victim until:
- ◆ you have switched off a domestic current; or
 - ◆ you have been officially informed that a high-voltage current has been switched off and isolated.



CHEMICAL SPILLS

- ▶ Protect yourself from corrosive chemicals.
- ▶ Make sure that any contaminated rinsing water drains away safely.
- ▶ Be aware of the dangers of toxic fumes.
- ▶ Seal the chemical container, if possible; ventilate the area.



SWALLOWED POISONS

SEE ALSO:
PAGES 183-90

PRECAUTIONS

■ **DO NOT** attempt to induce vomiting.

■ **IF** there is vomit in the mouth, lay the victim on his side to allow any vomit to drain away safely.

■ **IF** the victim stops breathing, be prepared to resuscitate (see pages 252-61). When giving mouth-to-mouth respiration, use a face shield to protect yourself.

■ **IF** the lips are burned, use a face shield when giving mouth-to-mouth respiration.

ACTION

CHECK AIRWAY
AND BREATHING



PLACE VICTIM
IN RECOVERY
POSITION

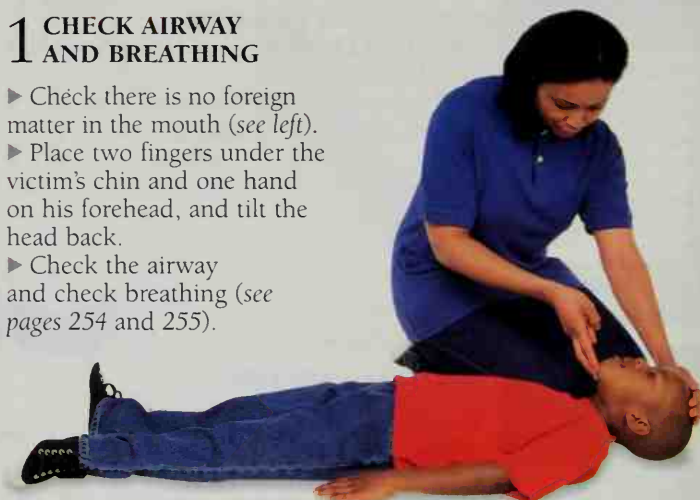


CALL
EMS

FOR AN UNCONSCIOUS VICTIM

1 CHECK AIRWAY AND BREATHING

- Check there is no foreign matter in the mouth (*see left*).
- Place two fingers under the victim's chin and one hand on his forehead, and tilt the head back.
- Check the airway and check breathing (*see pages 254 and 255*).



2 PLACE VICTIM IN RECOVERY POSITION

- Ensure that the airway remains open (*see pages 254 and 255*).



3 DIAL 9-1-1 OR CALL EMS

- Give as much information as possible about the swallowed poison.
- Monitor and *record* breathing, pulse, and level of response every ten minutes until help arrives.



ALLERGIC REACTIONS

SEE ALSO:
PAGES 81 and 213

RECOGNITION

- ◆ Anxiety
- ◆ Red, blotchy skin
- ◆ Swelling of face and neck
- ◆ Puffiness around eyes
- ◆ Impaired breathing
- ◆ Rapid pulse

PRECAUTIONS

■ Check for an Epi-Pen or syringe of epinephrine. If necessary, assist the victim to use it. It can save his life when given promptly.

■ **IF** the victim becomes unconscious, place him in the recovery position (see page 256), and be ready to resuscitate, if necessary (see pages 252–61).

ACTION

CALL
EMS



ASSIST WITH
EPINEPHRINE
ADMINISTRATION
IF AVAILABLE



MONITOR VICTIM

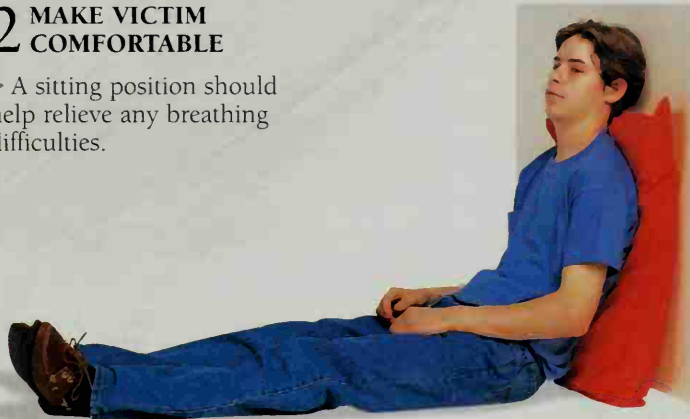
1 DIAL 9-1-1 OR CALL EMS

► Pass on as much information about the cause of the allergy as possible.



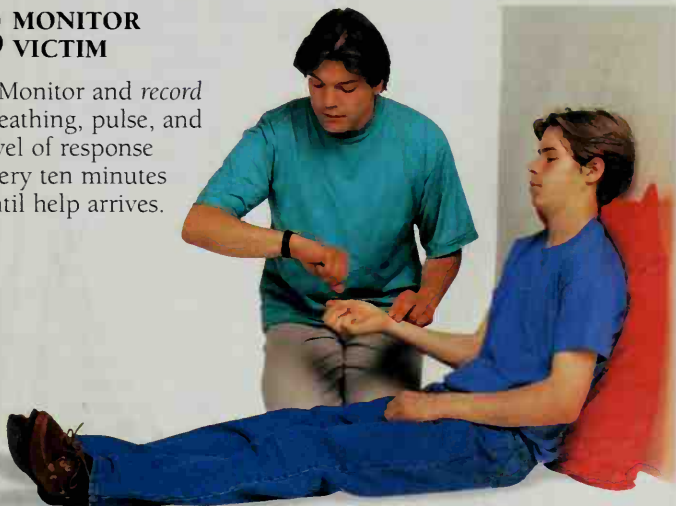
2 MAKE VICTIM COMFORTABLE

► A sitting position should help relieve any breathing difficulties.



3 MONITOR VICTIM

► Monitor and *record* breathing, pulse, and level of response every ten minutes until help arrives.



OBSERVATION CHART

The information from this chart will be very valuable when decisions are made about further treatment:

♦ use a photocopy of it to record your observations while waiting for help;

♦ check the appropriate boxes;
♦ update them at ten-minute intervals;
♦ send the completed chart, and any notes, with the person when he or she leaves your care.

DATE		PERSON'S NAME					
Time of observation (10-minute intervals)		0	10	20	30	40	50
Eyes Observe for reaction while testing other responses.	Open spontaneously						
	Open to speech						
	Open to painful stimulus						
	No response						
Movement Apply painful stimulus: pinch the earlobe or skin on back of hand.	Obeys commands						
	Responds to painful stimulus						
	No response						
Speech When testing responses, speak clearly and directly, close to person's ear.	Responds sensibly to questions						
	Seems confused						
	Uses inappropriate words						
	Incomprehensible sounds						
	No response						
Pulse (beats per minute) Take pulse at wrist or at neck on adult (page 260); at inner arm on baby (page 261). Note rate, and whether beats are weak (w) or strong (s), regular (reg) or irregular (irreg).	Over 110						
	101-110						
	91-100						
	81-90						
	71-80						
	61-70						
	Below 61						
Breathing (breaths per minute) Note rate, and whether breathing is quiet (q) or noisy (n), easy (e) or difficult (diff).	Over 40						
	31-40						
	21-30						
	11-20						
	Below 11						

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